ANNUAL REPORT

1984—'85

206624

KERALA AGRICULTURAL UNIVERSITY

English

ANNUAL REPORT 1984-'85

Copies: 750

February, 1986

Compiled and Edited by
Directorate of Research

Published by

Director of Extension
Kerala Agricultural University
Mannuthy, Trichur-680651, Kerala

Printed at
Kerala Agricultural University Press
Mannuthy

CONTENTS

General Report

The Executive Committee of the Kerala Agricultural University presents to the General Council, its 12th Annual Administration Report for the period from 1-4-1984 to 31-3-85.

The report pertains to the General Administration, Education, Research, Extension Education, Works, Estate and Financial accounts. List of members of the statutory bodies of the University, Statute Amendments, Scientific, Administrative and Supporting staff of various institutions, list of new research projects and list of publications have been appended.

Sri T. Madhava Menon, IAS., continued as Vice-Chancellor of the University. Sri Thomas C. George IAS., Sri N. M. Abdul Kadir, Sri K. R. Krishna Pillai were continued as Registrar, Comptroller and Director of Physical Plant respectively.

Dr N. Sadanandan, Dr M. Krishnan Nair and Dr. M. J. Sebastian were continued as Deans of the Faculties of Agriculture, Veterinary & Animal Sciences and Fisheries respectively. Dr. P. C. S. Nair continued as Director of Research. Dr. A. G. G. Menon, was the Director of Extension during the period. Dr. P. K. Gopalakrishnan continued as Associate Dean of the College of Horticulture, Vellanikkara and Sri C. P. Muhammed was the Director of the Institute of Agricultural Technology, Tavanur during the period.

Dr. P. Basak, Head, Ground Water Division, CWRDM Calicut was appointed as Special Officer in the Kerala Agricultural University for the preparation of the project report for the establishment of Faculty of Agricultural Engineering and Technology.

The General Council met four times during the year under report including one special meeting held in October 1984 to discuss the report of the General Council members on their visit to the various institutions under the Kerala Agricultural University.

The Academic Council met three times during the year under report. The Board of studies in Agriculture, Veterinary and Fisheries Faculties were re-constitued.

Education

The teaching institutions under the University are the College of Agriculture, Vellayani, Trivandrum, The College of Horticulture at

Vellanikkara, College of Veterinary & Animal Sciences, at Mannuthy, College of Fisheries at Panangad and the Institute of Agricultural Technology at Tavanur in Malappuram district. Courses leading to Bachelor's Degree in Agriculture, Veterinary & Animal Sciences, Fisheries and Co-operation and Banking were offered from the respective Colleges. Master's and Doctorate Degrees in Agriculture, Horticulture and Veterinary and Animal Sciences were offered in the College of Agriculture, Vellayani, College of Horticulture, Vellanikkara and College of Veterinary & Animal Sciences, Mannuthy respectively. Master's Degrees in Agricultural Engineering and Agricultural Statistics were also offered from the College of Horticulture and College of Veterinary & Animal Sciences respectively.

The total staff strength of the four institutions was 569 at the end of the year. The details are given below:

	Colleges					IAT	
	Agri.	Horti.	Vety.	Fish.	Co-op	Tavanur	Total
Dean	1	—	1	1	—	—	3
Assoc. Dean	—	1	—	—	1	—	2
Director	—	1	1	—	—	—	2
Director—IAT	—	—	—	—	—	1	1
Professor	15	21	52	4	1	1	94
Assoc. Professor	33	19	22	12	8	1	95
Asst. Professor	41	55	57	22	29	10	214
JAP	37	42	45	15	4	15	158
Total	127	139	178	54	43	28	569

The vacancies existed in different educational institutions at the end of the year is as follows:

	Colleges					IAT	
	Agri.	Horti.	Vety.	Fish.	Co-op	Tavanur	Total
Dean	—	—	—	—	—	—	—
Associate Dean	—	—	—	—	1	—	1
Director	—	—	—	—	—	—	—
Professor	1	3	5	2	—	—	11
Director-IAT	—	—	—	—	—	1	1
Assoc. Professor	4	5	11	5	6	1	32
Asst. Professor	9	9	28	11	22	6	85
J.A.P.	18	26	23	11	2	8	88
Total	32	43	67	29	31	16	218

Admissions

During the period under report 549 students were admitted for various courses. The details of which are given below. The No. of students who have passed out from different colleges are also furnished.

	No. admitted	No. Passed
B. Sc. (Ag.)	160	126
B. Sc. (Hort) students who opted for B.Sc. (Ag.) course during 1981	—	28
B.V.Sc & A.H.	114	56
C. & B	29	nil
B.F.Sc.	32	18
B.Sc. (Hort)	nil	3
M.V.Sc.	13	3
Ph.D.	3	1
M.Sc	97	83
M.F.Sc	5	--
Ph.D	17	8
Diploma in Agricultural Sciences	60	41
Diploma in Agrl. Engineering	19	28
Total	549	395

The number of students (1688 Nos) who are on roll at the end of the year is as follows:

No. of students on the roll	Agri	Hort	V & AS	Fish	Co-op	IAT	Total
1	2	3	4	5	6	7	8
UG Courses							
B Sc. (Ag.)	285	270	—		—	—	555
B Sc. (C & B)	—	—	—	—	129	—	129
B F Sc		—	—	140	—	—	140
B V Sc & AH	—		419	—	—	—	419
Pre-professional	—	—	6	—	—	—	6
Total	285	270	425	140	129	—	1249

1	2	3	4	5	6	7	8
PG Courses							
M Sc (Ag)	105	49	—				154
M Sc (Hort)	—	10					10
M V Sc			27				27
M Sc (Ag Stat)	—		16			—	16
M.Sc (Ag Engg)		8	—		—		8
M F Sc				5			5
Ph D (Ag)	19	9			—	—	28
Ph D (Hort)	—	2			—	—	2
Ph D (V & As)			9		—	—	9
Total	124	78	52	5	—	—	259
Other Courses							
D.A.Sc					120		120
DARE					50		50
PG Diploma (Food & Nutrition)	4						4
Total	4				170		180

The research programmes of the University have been drawn out with emphasis on solving location specific, field oriented problems faced by the farmers of the State. In addition to the State funds, the University also secure assistance through ICAR under the NARP and from the World Bank under KADP and MSCRP. Assistance was also received from the Department of Science & Technology, and the Department of Environment, Government of India Under the National Agricultural Research Project, five regional research stations have been set up at Pilicode (Northern Region), Pattambi (Central Region), Kumarakom (Region of problem areas) Vellayani (Southern Region) and Ambalavayal (High range region). The technical and administrative control of these stations was vested with the respective Associate Directors and the overall control with the Director of Research. Scientists in the research stations were grouped into different divisions viz. Crop Improvement, Crop Production, Crop protection and Social Sciences according to the field of specialisation.

Seventeen project co-ordination groups in the faculty of Agriculture and seven in the faculty of Veterinary & Animal Sciences continued to function during the year. The faculty research committee of Agriculture and Veterinary Sciences each met twice and approved 109 and 32 research projects in Agriculture and Veterinary Science respectively for implementation. The Faculty Research Committee of the Fisheries met once and cleared 13 new projects for implementation. The faculty

research committee of each faculty monitored and evaluated all the research programmes regularly which was finally got approved by the General Council.

The Director of Research was assisted by three Associate Directors at the headquarters. The Associate Directors of Agriculture monitored the research programmes of different stations once in three months and the Director of Research inspected all the research stations at least once during the year and submitted detailed inspection report to the Vice-Chancellor.

A detailed VII Plan proposal for the University was formulated in the Directorate of Research and the plan proposals amounting to Rs.59.98 crores were forwarded to the ICAR and State Planning Board for their consideration.

In the faculty of agriculture eighteen research stations and six units viz. Sugarcane Research Centre, Chittoor; KADP at Vellanikkara; MSCRP at Madakkathara; AICRP Centre at Karumady and the Pineapple and Pepper Research Centres at Vellanikkara continued with their research activities. In the Faculty of Veterinary & Animal Sciences three research Stations one at Vellanikkara campus comprising of Livestock, Poultry and Piggery farm, one at Thiruvazhamkunnu and another at Thumburmuzhi are functioning. There are 49 ICAR projects functioning under the KAU as detailed below.

	Ad-hoc projects	Co-ordinated projects	ORP	Total
Faculty of Agriculture	11	24	2	37
Faculty of Vety & Anl. Sciences	9	3	—	12
Total	20	27	2	49

There was only one co ordinated project under the faculty of fisheries which was terminated by the ICAR on 31-3-1985

Scientific and popular articles published

During the period under report 202 scientific and popular articles were published by the staff members of various faculties as detailed below:-

Faculty	Scientific article	Popular article	Total
Agriculture	160	65	165
Veterinary & Anl. Sciences	15	5	20
Fisheries	5	7	12
College of Co-operation & Banking	5		5
Total	125	77	202

The new Research Projects submitted for funding from external agencies can be seen in Appendix VIII.

The staff strength in the Research Stations/Schemes/Projects was as follows as on 31-3-85

Stations	Assoc Director	Prof.	Assoc. Prof.	Asst. Prof.	JAP	Total
1	2	3	4	5	6	7
Faculty of Agriculture						
Regional Agricultural Research Station, Pilicode						
NARP	1	2	16	5	—	24
Non-plan	—	—	—	1	2	3
AICC &AIP		—	2	4	2	8
Pepper Res. Station, Panniyur						
Non-plan	—	—	1	1	1	3
ICAR Co ordinated projects	—	—	1	3	—	4
RARS Ambalavayal						
NARP	1	—	1	4	—	6
Non-Plan	—	—	—	3	—	3
Citrus Scheme	—	—	1	1	2	4
CRS Anakkayam	—	—	1	—	1	2
RARS Pattambi	1	1	10	25	10	47
BRS Kannara	—	—	1	5	5	11
KADP	—	5	2	6	—	13
Ginger scheme	—	—	1	2	—	3
Pepper scheme	—	1	—	—	1	2
AICRP on biological control of crop pests and weeds, Vellanikkara	—	—	1	—	2	3
AIC Vegetable Improvement Programme, Vellanikkara	—	—	—	2	—	2
AICRP on tuber crops, Vellanikkara	—	—	—	1	1	2
Vegetable seed Production Vellanikkara	—	—	—	1	1	2
AICFIP, Vellanikkara	—	—	1	—	2	3
Cashew Research Station, Madakkathara	—	—	1	1	1	3
MSCRP Madakkathara	—	1	1	1	—	3
ARS Mannuthy	—	1	—	1	5	7
AICRP Double cropping sub-centre	—	—	—	1	—	1
ICAR	—	—	—	1	—	1
NARP	—	—	2	2	1	5

	Assoc. Director	Prof.	Assoc. Prof	Asst. Prof	JAP	Total
1	2	3	4	5	6	7
ARS Chalakudy						
ICAR	—	1	3	4	—	8
NARP water management						
Eruthiampathy	—	—	—	4	—	4
RRS Vyttila	—	—	2	1	2	5
CRS Pampadumpara	—	—	3	6	—	9
AMPRS Odakkali	—	—	1	2	4	7
RARS Kumarakom						
Root wilt scheme	—	1	2	4	2	9
NARP	—	—	3	7	5	15
RRS Moncompu	—	1	5	13	13	32
SRS Thiruvalla	—	—	2	1	4	7
AICRP on Agrl. Drainage.						
Karumady	—	—	1	2	—	3
RRS Kayamkulam	—	—	4	4	5	13
CSRC Karamana	—	1	—	4	3	8
ECF Quilon	—	—	1	—	—	1
ECF Palghat	—	—	1	—	—	1
NARP - Vellayani	1	—	3	6		10
Kottarakkara	—	—	2	5	—	7
AICRP on Forage Crop		—	1	2	2	5
CRS Balaramapuram	—		1	1	—	2
AICRP on Agroforestry.						
LRS. Thiruvazhamkunnu	—		1	3	4	8
National Demonstration						
Scheme, Sadanandapuram	—		1	3	—	4
Total	4	15	80	143	81	323
Faculty of Veterinary & Animal Sciences						
AICRP on Poultry for eggs	1	—	6	4	11	
AICRP on utilisation of						
Agro-Industrial by-products						
for evolving economic						
ration for livestock	1		2	2	5	
AICRP on goats, Mannuthy	2	—	4	3	9	
Pig Breeding Farm, Mannuthy	—	—	2		2	
Poultry and duck farm						
Mannuthy	—	—		1	1	

1	2	3	4	5	6	7
University Livestock Farm, Mannuthy	—		1	—	2	3
Fodder Research scheme, Mannuthy	—	—	—	1	1	2
University Vet hospital Kokkalai & Mannuthy		1		1	—	2
Livestock Research Station, Thiruvazhamkunnu	—	—	2	1	4	7
Cattle Breeding Farm, Thumburmuzhi	—	—	1	1	—	2
ICAR adhoc project on Nutrient requirement of caged layers	—	—	—	1	—	1
Total	—	5	4	19	17	45
Faculty of Fisheries						
Fisheries Station, Puduveypu	—		1	2	1	4
Fisheries Station, Moncompu	—	—	—	—	1	1
Prawn Centre, Pokkali	—	—	—	1	—	1
AICRP on Brackishwater fish farming, Vyttila	—	—	1	—	—	1
Total	—	—	2	3	2	7
Grand Total	4	20	86	165	100	375

The following were the vacancies in the various Research Stations during the year 1984-85

Station	ADR	Prof.	Assoc. Prof.	Asst Prof.	JAP	Total
1	2	4	4	5	6	7
Faculty of Agriculture						
RARS Pilicode	—	—	5	4	1	10
RARS Ambalavayal	—	—	1	6	—	7
PRS Panniyur	—	—	—	2	1	3
RARS Pattambi	—	—	2	14	9	25
BRS Kannara	—	—	—	2	2	4
ARS Chalakudy	—	—	—	4	—	4
CRS Pampadumpara	—	—	1	5	—	6
AMPRS Odakkali	—	—	—	1	3	4

1	2	3	4	5	6	7
RARS Kumarakom	—	—	—	2	2	4
RRS Moncompu	—	—	—	7	7	14
SRS Thiruvalla	—	—	—	—	3	3
KADP	—	—	—	1	—	1
RRS Kayamkulam	—	—	—	2	2	4
ARS Mannuthy	—	—	—	1	3	4
LRS Thiruvazhamkunnu	—	—	—	2	4	6
National Demonstration Scheme, Sadanandapuram	—	—	—	1	—	1
Total	—	—	9	54	37	100
Faculty of Veterinary & Animal Sciences						
AICRP on utilisation of Agro-industrial by-products for evolving ration for livestock	—	—	—	1	—	1
AICRP on goats	—	—	—	—	1	1
Pig Breeding farm, Mannuthy	—	—	—	1	—	1
Poultry & Duck farm, Mannuthy	—	—	—	—	1	1
Livestock Research Station, Thiruvazhamkunnu	—	—	1	1	3	5
Total	—	—	1	3	5	9
Faculty of Fisheries						
Instructional farm and Fisheries station, Puduveypu	—	—	—	—	1	1
Grand Total	—	—	11	59	48	110

The following additional teaching posts were created during the year 1984-85 in various Institutions/Schemes

1	Director 2	Assoc Dean 3	Prof 4	Assoc Prof 5	Asst Prof 6	JAP 7	School Teacher 8	Total 9
College of Agriculture, Vellayani	—	—	—	2	6	3	—	11
College of Horticulture, Vellanikkara	—	—	4	2	4	6	—	16
College of Co-operation and Banking, Mannuthy	—	1		1	11	—	—	13

1	2	3	4	5	6	7	8	9
College of Vety & Ani Sciences, Mannuthy	1	—	6	15	14	21	—	57
College of Fisheries, Panangad	—	—	—	4	4	5	—	13
Directorate of Extension, Mannuthy	—	—	—	1	1	1	—	3
KAU School	—	—	—	—	—	—	2	2
Centre for advanced studies for Humid Tropical tree crops	—	—	—	8	8	5	—	21
KVK Manjeswar	—	—	—	—	—	1	—	1
KVK Ambalavayal	—	—	1	4	6	—	—	11
Operational Research Project, Pattambi	—	—	—	1	—	4	—	5
SIDA Project, Vellanikkara	—	—	—	—	1	—	—	1
Development of Tribal Colony, Peechi	—	—	—	—	—	1	—	1
Cattle Infertility centre at Calicut Kottarakkara	—	—	1	3	4	2	—	10
ICAR adhoc scheme-Nutrient requirement of caged layers	—	—	—	—	1	—	—	1
ICAR adhoc scheme-Development of Improved varieties-sesamum & groundnut, Onattukara region	—	—	—	—	1	—	—	1
Total	1	1	12	41	61	49	2	167

Extension Education

The Directorate of Extension provides technical expertise to the field extension personnel of various development departments in the State, disseminate scientific and technical information to the farmers through different media and offers technical assistance to voluntary service organizations and other educational institutions These programmes are being implemented through the Training Service Schemes. Farm Advisory Service, Communication Centre, Krishi Vigyan Kendras National Demonstration Scheme, Lab to Land programme, Village Adoption Programme, Tribal Area Research Centre etc. The Extension Education programme are being implemented by the staff attached to the Colleges and Research Stations. In addition, specific schemes are also functioning

under the Directorate of Extension. The staff and the vacancy position in the various units attached to the Directorate of Extension during 1984-85 is also furnished below:-

The following are the staff position relating to the Directorate of Extension Education during 1984-85

Station	Director	Assoc. Dire.	Prof/ Editor	Assoc. Prof.	Asst. Prof.	JAP	Total
Directorate of Extension	1	1	1	—	—	—	3
Farm Advisory Service	—	—	2	5	1	—	8
Communication Centre							
i) Information unit	—	—	—	1	4	2	7
ii) Publication unit	—	—	—	1	5	—	6
iii) Exhibition & graphic unit	—	—	—	—	1	1	2
Training Service Scheme							
i) Mannuthy	—	—	—	—	1	—	1
ii) Tavanur	—	—	—	—	1	2	3
iii) Vellayani	—	—	—	—	1	—	1
Krishi Vigyan Kendra							
i) Pattambi	—	—	1	4	5	—	10
ii) Ambalavayal	—	—	1	4	6	—	11
AICRP on Scheduled Castes-Area Research Centre. Nilamboor	—	—	—	1	3	—	4
Tribal Area Research Centre, Amboori	—	—	—	1	6	5	12
National Demonstration Scheme. Sadanandapuram	—	—	—	1	3	—	4
Total	1	1	5	18	37	10	72

The following are the vacancies in the various units attached to the Directorate of Extension Education during 1984-85

1	Director 2	Assoc. Dire. 3	Prof. 4	Assoc. Prof. 5	Asst. Prof. 6	JAP 7	Total 8
Farm Advisory service	—	—	—	1	1	—	2
Communication Centre							
i) Information unit	—	—	—	1	1	1	3
ii) Publication unit	—	—	—	—	1	—	1
Training Service Scheme, Tavanur	—	—	—	—	—	2	2

1	2	3	4	5	6	7	8
Krishi Vigyan Kendra					1		1
i) Pattambi			1	4	3		8
ii) Ambalavayal							
AICRP on Scheduled Castes Area Research Centre, Nilambur				—	2		2
Tribal sub research centre, Amboori					—	3	3
National Demonstration Scheme, Sadanandapuram				—	1		1
Total			1	6	10	6	23

Forty two training programmes were conducted during the year for the various departments and agencies. The Communication Centre provides information support to the Extension personnel of the State Development Departments, voluntary organisations, farmers etc. Feature articles, questions and answers, technical publications, radio-programmes exhibition, correspondence courses etc., constitute the information support programmes of the centre.

Under the publication unit a number of regular periodicals were published which include Agricultural Research Journal of Kerala (half yearly), Kerala Journal of Veterinary Science (half yearly) Kalpadhenu (quarterly), KAU Newsletter (monthly) and Nutrition Newsletter (quarterly). In addition 19 technical bulletins & books were also publishsd both in English and Malayalam.

The exhibition and graphic service units conducted two major exhibitions-one at Trichur and another at Ernakulam. In addition 16 mini exhibitions were also conducted in the Lab to Land and Village Adoption centres of the University. The University bagged the first stall award during the Pooram Exhibition as in previous years. The Krishi Vigyan Kendras-one at Pattambi and another at Ambalavayal are also functioning. In addition a new Krishi Vigyan Kendra was started in Kasaragod district for the benefit of the linguistic minorities. The Village Adoption Programmes, the NSS programmes, Lab to Land programmes and All India Co-ordinated programmes on Scheduled Caste and Scheduled Tribe at Nilambur and Amboori are also functioning under the Directorate of Extension.

ENGINEERING WING

The Engineering Wing of the Kerala Agricultural University consists of the Directorate of Physical Plant, Vellanikkara, with two divisions - one at Pilicode and another at Panangad. Sri. K. R. Krishna Pillai continued as

Director of Physical Plant during the period under report. The major items of civil works included various staff quarters under NARP, hostels, laboratory buildings under NARP and formation of roads, Bachelors hostel, trainees hostel, school building, glass house, net house, ladies hostel were also completed during the period under report. Budget provision for the year was Rs. 350 lakhs under works (Plan) and Rs 25 lakhs under maintenance and repairs. The expenditure was Rs. 310 lakhs.

ESTATE

Sri K. T Narayanan Nambiar continued as Estate Officer during the year. A total quantity of 28.56 tonnes of rubber was produced during the year and 22 tonnes were disposed of realising a value of Rs. 10.2 lakhs. A total number of 2155 trees were cut and removed for timber at a cost of Rs. 2.43 lakhs. The total expenditure during the year was 12.92 lakhs.

FINANCE

Sri N. M. Abdul Kadir continued as Comptroller till 2-11-84 and and Sri. P. M. Krishnan Kutty Nair, Deputy Comptroller was in additional charge of the post till his retirement on 31-12-84. From 1-1-85 onwards Sri. K. T. Narayanan Nambiar is continuing as Comptroller i/c.

For 1984-85 the University had approved a budget of Rs. 1526.45 lakhs. The University had spent Rs 617.68 lakhs under plan and Rs. 452.02 lakhs under non plan during the year. During 1984-85, Government has released Rs. 452.54 lakhs under non-plan and Rs. 275 lakhs under plan. Income from University properties was 105.78 lakhs. ICAR has released Rs. 216.78 lakhs. Government also released Rs. 7.33 lakhs for KADP.

CHAPTER I

General Administration

The Kerala Agricultural University came into existence from 24th February 1971 under the Kerala Agricultural University Act 1971 (Act 33 of 1971).

The main campus of the University at Vellanikkara is 10 km east of Trichur town on the Trichur–Palghat Highway (NH 47). The College of Horticulture is located in the main campus. The University has four other teaching campuses, namely, the College of Veterinary and Animal Sciences at Mannuthy, the College of Fisheries at Panangad, Cochin, the College of Agriculture at Vellayani, Trivandrum and the Institute of Agricultural Technology at Tavanur in Malappuram District. In addition, the University has 21 research stations distributed throughout the State. Some of the stations are also recognised as centres for post-graduate research of the University. When the National Agricultural Research Project was implemented in the University, five of these stations were recognised as Regional Agricultural Research Stations. The five Regional Stations are located at Pilicode, Ambalavayal, Pattambi, Kumarakom and Vellayani.

The University received financial assistance mainly from the State Government and ICAR. Financial assistance was also received from outside agencies under the Kerala Agricultural Development Project, National Agricultural Research Project, Kerala Agricultural Extension Project (T & V), SIDA, Multi Unit Cardamom Research Project and from the Department of Science and Technology and Department of Environment, Government of India.

Officers of the University and Administrative set up

The Officers of the University are the Chancellor of the University His Excellency the Governor of Kerala, the Pro-Chancellor, the Hon'ble Minister for Agriculture and the Vice-Chancellor who is the chief executive and academic officer of the University. The Vice-Chancellor is also the ex-officio Chairman of the Board of Control for Crop

Committee and Academic Council. The Vice Chancellor is a full time officer of the University and has the immediate overall control of the University.

The general administrative control is vested with the Registrar while the Comptroller is responsible for budgeting, finance, statements of accounts and audit. The co-ordination, direction and administration of research activities in the University is vested with the Director of Research. The Director of Extension is responsible for extension education and public relations. The Dean of Faculty is the Dean of the various Faculties and in charge of research, teaching and instruction in the respective colleges. The Director of Physical Plant is in overall charge of the construction and maintenance of buildings and roads, vehicles and machinery.

Authorities of the University

The statutory authorities of the University are the General Council, Executive Committee, Academic Council, the Faculties and Board of Studies of the Faculties. The list of the members of these bodies is given in Appendix-I.

General Council

The supreme authority of the University is the General Council. It comprises of 57 members of whom 18 are Ex-officio, 18 selected members, 17 nominated members, one representative from each of the three Universities of the State and ICAR nominee. The Council is reconstituted every three years; the present Council was reconstituted with effect from 31-1-1983. Ordinarily, the Council meets once in four months. During the year under report the Council met four times on 30th July 1984, 27th October 1984, 29th November 1984 and 27th and 28th March 1985. A special meeting of the General Council was convened on 27-10-1984 to discuss the report of the General Council members on their visit to the various institutions under the Kerala Agricultural University.

The Executive Committee

The Executive Committee is the Chief Executive authority of the University. The Committee consists of eleven members with the Vice-Chancellor as the Chairman. The other members include three Ex-officio members six elected members of the General Council and the ICAR representative of the General Council. During the year 16 meetings (141st to 156th) were held. Among the major decisions taken by the Executive Committee include the establishment of Computer Centre at the Kerala Agricultural University Headquarters, Vellanikkara and the establishment of Faculty of Agriculture Engineering and Technology at Tavanur.

Academic Council

The Academic Council is responsible for the maintenance of standards of instructions in different Faculties of the University. The new Academic Council was constituted on 6-11-1984 for a period of three years. Council met on 19th May 1984 and 18th September 1984. The courses M. Sc. in Food Science and Nutrition, M. F. Sc. and Ph. D. in Agricultural Extension were approved for offering from the concerned Colleges. Steps for the preparation of the post-graduate courses leading to M. Sc. in Forestry were also taken.

Board of Studies

The Board of Studies of the each Faculty has an advisory role to look into the maintenance of academic standards. The Board of Studies were reconstituted in all the Faculties on 21-8-1984. The Board of Studies of Agricultural Faculty met at the College of Agriculture, Vellayani on 29-10-1984

Post-graduate Committee

The post-graduate committee meetings were held on 25-4-1984 (25th meeting), on 6-8-1984 (26th meeting) and on 5-12-1984 (27th meeting).

Some of the important engagements of the Vice-Chancellor during the year were as follows:

The Vice-Chancellor participated in the Panel Discussion on "A Management Oriented programme for Professional Programmes" at the Institute of Management in Government. He presided over the inaugural function of the Festival of Tribal Art Forms, at the school of Drama. He participated in the Workshop on Eco-Development of Western Ghats. He inaugurated the "Agricultural Book Corner" at the Public Library, Trichur. The Vice-Chancellor discussed with the Minister for Forest & Animal Husbandry, the possibility of increasing the intake capacity at the College of Veterinary & Animal Sciences. He participated in the deliberations pertaining to the Year of Sri. Narayana Guru at the Kanakakunnu Palace. He presided over the inaugural function of the Regional Centre for Cattle Infertility & Jersey Calves. He attended the meeting of the ICAR Regional Committee held at Coimbatore. He inaugurated the Farm Clinic at Nellikkunnu under the Village Adoption Programme. The Vice-Chancellor spoke at the Seminar on "Eco Development of Western Ghats" held at the Kerala Forest Research Institute. He inaugurated the training programme for Tribal Youths in modern agricultural practices under the Extension Wing of the University. He participated in the Extension Seminar conducted by the PG students of the College of Agriculture at Vellayani and spoke on the Challenges facing the professional nature of

agricultural courses. He delivered extension lecture at Dr. John Mattai Centre of the University of Calicut on "Dialectical Determinants of Agricultural Productivity in Kerala".

The Vice-Chancellor visited the Manipur State and discussed with the Chief Secretary and other officials on the development of Soil Heritage for which a team of experts from the University visited the State.

The Vice-Chancellor participated in the Seminar of Indian Veterinary Association held at Trivandrum, a Press meet for the Academic Staff College at Hotel Aiswarya, a Press meet for the Police Meet at the Armed Reserve Camp, RV Park and the meeting of the Technical Co-ordination Committee of Groundwater Studies in Central Kerala.

In the capacity of Chairman/Member, the Vice-Chancellor participated in the meetings of the following Committees of the State Planning Board:

The High Level Committee on Land & Water

The Sub-Committee on Human Welfare

The Sub-Committee on Agro-based & Forest-based industries

The Vice-Chancellor participated in the Governing Body meeting of the Centre for Water Resources Development & Management and the Kerala Forest Research Institute and also presided and led the meetings of University bodies, viz., the General Council, the Executive Committee, the Academic Council, the PG Committee, the Works Committee, the NSS Advisory Committee etc.

Being the Chairman of the High Level Committee to Review Forest Policy the Vice-Chancellor presided over its meetings also.

Assurance Committee

The Assurance Committee with Sri. O. Lukose as Chairman met six times during the year under report.

Accounts Committee

The Accounts Committee under the Chairmanship of Prof. K. J. Kurian met 20 times during the year under report.

Statute Sub Committee

The Statute Sub Committee under the Chairmanship of Prof. Alexander Zacharias met once during the year under report.

Officers' meeting

The University Officers met regularly under the Chairmanship of the Vice-Chancellor. During the period under report, four meetings were

held. The important decisions taken in the meetings were (a) To follow the 10% reservation for SC and ST candidates for deputation for higher studies (b) To sponsor two Horticulturists for specialised training in ornamental and landscaping gardening at Japan.

University Organisation

The KAU Act envisages the establishment of Faculties of Agriculture, Veterinary and Animal Sciences, Fisheries, Basic Sciences & Humanities, Co-operation, Home Science, Agricultural Engineering and Forestry. However, only three Faculties, namely, Agriculture, Veterinary & Animal Sciences and Fisheries have been established. Action has been initiated during the year under report to establish Faculties of Co-operation, Home Science and Agricultural Engineering & Forestry.

Research Council

In order to advise to formulate the research programmes of the University, the Research Council, the Research Advisory Committee, the Faculty Research Committee and the Project Co-ordination Committees are functioning. The Research Council also has representatives from the Scientists of the other Agricultural Universities in South India and sister Universities of Kerala in addition to the Scientists from Kerala Agricultural University. The Research Council met once during the period under report.

The Extension Advisory Committee renders advice in extension education activities which are organised through the Directorate of extension. The above committee also met once during the year under report.

Faculty Improvement

The Staff members were provided with opportunities to acquire higher qualifications by granting deputation, study leave or leave for study purposes. Staff members were also sent for short term training courses, summer institutes etc., in different research institutions and for participating in seminars, symposia, workshops etc., organised by different scientific societies, ICAR Institutes or other Universities.

Students Admission

Admission for undergraduate courses in Agriculture, Veterinary and Fisheries were made on the basis of a common entrance examination conducted by the Government of Kerala. Admission for B.Sc. (Coop.) programme was given to students purely on merit based on the marks obtained for the qualifying examination. However the prescribed communal reservation was followed while giving admission to the various courses as decided by the Government of Kerala. Admission to the various post graduate courses were given on the basis of marks

obtained in the qualifying examinations, experience, number of research papers published and the performance at the interview. A few seats were reserved for ICAR nominees and SC, ST candidates.

Labour

Farm labourers constitute a major category of personnel in the farm research stations under the University. Two categories of workers—casual and permanent—exist in the farms and research stations under the Kerala Agricultural University. In respect of service conditions and wages, generally, the University follows Government orders applicable to the labourers of the Department of Agriculture and Animal Husbandry.

The permanent labourers are under specified pay scales, ie Rs. 185-3-209-4-245-5-285 for men and Rs. 175-3-199-4-235-5-275 for women. They are eligible for pension and gratuity. In addition to the pay, permanent labourers are entitled to fixed DA, HRA, and variable DA @ Rs. 1.10 for every 5 points of Cost of Living Index beyond 1000 points at Ernakulam.

The casual labourers are on daily rated wages. The basic wage is Rs. 6.75 for men and Rs. 5.25 for women labourers. In addition to this they are eligible for variable DA @ 10 paise for every 10 points beyond 900 points in Travancore-Cochin areas. The same rates are applicable for the workers in Malabar area with the exception that the variable DA is calculated for points beyond 1000 only.

The total permanent labour strength in the farms under the University was 1177. In addition to the permanent labourers, there were about 2800 casual labourers and they were given work as and when work was available. In the recruitment of casual labourers a minimum of 10% reservation was allowed to scheduled castes/tribes. In the Regional Agricultural Research Station, Ambalavayal (research station situated in tribal area) 20% of the vacancies of permanent labourers were reserved for ST (Adivasis). The University has the largest number of permanent labourers in the Instructional Farm, Vellayani, followed by Regional Agril. Research Station, Ambalavayal and Regional Agril. Research Station, Pattambi.

Permanent labourers are eligible for pension. A provident Fund Scheme is also in force and the rate of subscription of worker is 6¼% of the monthly wages. For casual labourers, who are not eligible for pension, the University introduced a contributory Provident Fund Scheme, the contribution being 6¼% of the monthly wages by the worker and an equal contribution by the University. Both permanent and casual labourers are eligible for gratuity also. They are also eligible for leave with wages @ 1 day for every 20 day's work, National Festival holidays, sick leave, maternity leave for female labourers etc.

In deserving cases, labourers are sanctioned with ex-gratia payments for meeting medical expenses. During the year under report, 10 labourers who met with accident while on duty were given ex-gratia payments.

In the Vellanikkara Rubber Estate, the University has tappers, factory workers, field workers as well as staff and supervisors; the strength of the Estate staff and workers, being around 100. For the Estate staff and workers, the University is giving all benefits contemplated in the Plantation Labour Act. The University is also following recommendations of Plantation Labour Committee in respect of payment of wages and fringe benefits. Instead of bonus, the University pays ex-gratia payments not less than the minimum rate of bonus, to the estate staff and workers.

In addition to the categories of labourers mentioned above, 10 casual labourers are being engaged in the KAU Press and about 40 workers are engaged on daily wages in the Engineering wing of the University.

The following are some of the service benefits sanctioned to labourers during the period under report. (1) Special casual leave not exceeding 12 days per year to those who are members of Panchayats for attending Board meeting; (2) Special casual leave for appearing before enquiring authority in connection with disciplinary proceedings and (3) Special casual leave for antirabic treatment were also sanctioned to permanent labourers. Employment assistance under dying in harness scheme applicable to regular employees was also extended to the permanent labourers. Leave benefits such as National and festive holidays, sick leave and leave with wages admissible to farm labourers were extended to the casual labourers of the Engineering Wing and KAU Press.

There were no major strikes by the labourers during the report period except general strikes organised by the Trade Unions on National/ State level.

CHAPTER I

Education & Research

FACULTY OF AGRICULTURE

1.1 COLLEGE OF AGRICULTURE, VELLAYANI

The College of Agriculture, is located at Vellayani 11 km south of Trivandrum city. The College is surrounded by Vellayani lake on three sides. The college was established in August 1955. The campus has an area of 243 ha.

During the year under report, Dr N. Sadanandan continued as Dean, Faculty of Agriculture and Head of the Institution. Dr M. M. Koshy continued as Professor, Research Co-ordination in Agricultural Faculty. Dr N. Mohanakumaran continued as Associate Director, NARP Southern region located at Vellayani.

The following departments are functioning in the College of Agriculture:

Agronomy, Agril. Botany, Soil Science & Agril. Chemistry, Agril. Entomology, Plant Pathology, Plant Breeding, Agril. Extension, Agril. Statistics, Horticulture, Home Science, Agril. Economics, Agril. Engineering and Animal Husbandry.

The list of scientific staff in each Department is furnished in Appendix.

New Departments sections projects sanctioned during the year

The following new adhoc projects were sanctioned under the Department of Home Science.

Action research on the use of Labour Saving devices in rural houses of Kerala

The main objective of the scheme is to popularise labour saving devices such as smokeless choolahs and hay box among rural families in the state. The project is for a period of two years from 15-11-84 for Rs. 39,550 - fully financed by the Department of Science and Technology, Government of India.

Tapioca consumption and goitre incidence in Kerala

The main objectives of the project are to map out the magnitude and geographical distribution of malnutrition with particular reference to the incidence of goitre among the rural people of Kerala, subsisting on tapioca and to find out the relationship between the socioeconomic factors and the incidence of goitre and to suggest appropriate corrective measures

The project is for a period of three years and fully financed by ICAR and the total outlay is Rs 55,200/-.

A training cell in rural home science has been sanctioned The project is financed by UNICEF

Research Project on possibilities of using unsymmetrical dimethy urea as urea nitrification inhibitor for increasing efficiency of nitro genous fertilisers has been sanctioned. The project is financed by ISRO.

Project on integrated development of Kanikkar Tribals dispersed in the hamlets situated on the slopes of Agasthyamudi

New posts sanctioned during the year

Discipline	Assoc. Prof	Asst. Prof	Jr. Asst. Prof	Name of the Scheme
Agril. Extension	1	1	—	Ph D programme
Agril. Extension	—	1	—	PG Diploma in
Food Science & Nutrition	—	1	1	food & Nutrition
Food Science & Nutrition	1	1	1	MSc in Food Science & Nutrition
Agril. Chemistry	—	—	1	Scheme on unsymmetrical dimethyl urea
Food Science & Nutrition	—	—	1	Training Cell in Rural Home
Child Development	—	—	1	Science
Home Science & Extension	—	—	1	
Home Science	—	—	1	Development of Kanikkar tribals
Total	2	4	6	

Posts shifted abolished during the year

The post of Professor of Agril. Statistics was shifted back from the College of Veterinary & Animal Sciences and Shri P. V. Prabhakaran took charge on 1-6-1984.

The post of Associate Professor of Agronomy at Agril. Research Station, Mannuthy was temporarily converted as Associate Professor (Plant Pathology) and shifted to this College. Dr C. K. Peethambaran, who was on deputation, assumed charge as Associate Professor in the above post on 18-10-84.

The post of Professor of Plant Pathology, College of Horticulture was temporarily shifted to this Institution along with the incumbent, Dr K. I. Wilson, who assumed charge on 24-11-1984.

Changes in personnel by new appointment/transfer etc

Dr R. Murlaeedhara Prasad, Assistant Professor joined duty in the Department of Agril. Extension on transfer vice Sri R. Prakash, Assistant Professor transferred to Communication Centre, Mannuthy.

Dr S. Ramachandran Nair, joined duty as Professor of Horticulture in this Institution on 18-4-1984.

Smt P. Prabhakumari, Assistant Professor joined duty in the Department of Soil Science and Agril. Chemistry on transfer.

Sri K. Vasanthakumar, Assistant Professor joined duty in the Department of Horticulture against the post of Associate Professor which fell vacant on promotion of Shri G. Sreekantan Nair as Professor of Horticulture at the College of Horticulture.

Sri P. V. Prabhakaran, selected and appointed as Professor of Agril. Statistics, assumed charge on 1-6-1984.

Smt Lizy Behanan joined duty as Junior Asst. Professor in the Department of Home Science on transfer.

Dr B. Babu, Associate Professor of Agril. Extension joined duty in the Department of Agril. Extension on transfer.

Smt Lulu Das appointed as Junior Assistant Professor (Plant Pathology) joined duty on 1-5-1985.

Smt Syamakumari provisionally appointed as Junior Assistant Professor joined duty on 7-3-1985 (Food Science & Nutrition)

Smt Achamma Chandy, provisionally appointed as Junior Assistant Professor (Food Science & Nutrition), joined duty on 7-3-1985.

Smt V. Girija Devi, provisionally appointed as Junior Assistant Professor, Home Science joined duty on 4-3-85.

Faculty Improvement Programme

Sri M. Abdul Salam, Assistant Professor (Agronomy) rejoined duty after completion of his Ph. D programme at TNAU, Coimbatore.

Sri C. Gokulapalan, Junior Assistant Professor (PP) on completion of his Ph. D programme rejoined duty on 26-7-1984.

Dr C. K. Peethambaran, Associate Professor on return from deputation rejoined duty in this college on 18-10-1984.

Smt A. Hasoomi Beevi, Assistant Professor, Entomology on completion of study leave rejoined duty on 7-11-84.

Dr D. Dale, Associate Professor of Entomology was granted extension of deputation for Senior Post-Doctoral Fellowship at IRRI, Manila.

Dr. S. T. Mercy, Associate Professor of Agril. Botany continued to be on leave for Post-Doctoral studies at IRRI, Manila.

Smt. Lekha Sreekantan, Assistant Professor (Agronomy) entered on leave for undergoing Ph. D. course at TNAU, Coimbatore from 19-5-84.

Smt T. Nalinakumari, Assistant Professor (Entomology) was granted study leave from 17-4-84 to undergo Ph. D. course.

Sri B. K. Jayachandran, Assistant Professor (Hort.) was granted study leave with effect from 31-12-84 to undergo Ph. D course.

Sri O. Abdul Rehiman Kunju, Associate Professor (Extension) was granted study leave with effect from 31-12-84 for undergoing Ph. D course.

Sri V. S. Balakrishnan, Assistant Professor (Animal Husbandry) was relieved with effect from 2-1-1985 for joining Ph. D course at Tirupati Veterinary College, APAU.

Details of seminars/symposia/extension lectures/training programmes/correspondence course etc conducted by the institute

Campaign on better infant feeding practices

A one day campaign on better infant feeding practices was conducted in the small and medium town development project areas of Shertallai on 14-9-1984 and at Kayamkulam on 16-9-1984.

Workshops

Thirteen monthly T & V workshops were conducted for the Trivandrum District.

Fifth and sixth regional workshop of NARP (SR) and Zonal workshop of T & V were conducted at Vellayani during the year.

Correspondence course on Better Infant feeding practices

A correspondence course on better infant feeding practices in malayalam of seven months duration was offered with UNICEF assistance.

About 567 candidates including both men and women participated in the programme. The course comprised of lessons prepared in simple language. They were sent to the participants at regular intervals Schedules containing simple objective type of questions pertaining to each lesson were prepared, sent to the participants and their answers collected and evaluated.

Training programmes

The following training programmes were conducted during the year in this campus.

Training in A. V. aids and extension methods for teachers of KAU.

Training programme in extension methods for Junior Agricultural Officers.

Training in extension for Foresters and Forest Rangers.

Six months pre-service training to Agril. Demonstrators.

Short term training course in Agriculture for KANFED workers.

Training on Fodder production and preservation to Junior Agril. Officers of Department of Agriculture.

Training on plant protection for the Agril. Demonstrators of Department of Agriculture.

Training on Fruit and vegetable preservation and processing to unemployed rural women.

Training on basket weaving to unemployed rural women.

Extension Lectures

Dr V Sivasubramonian, Professor of Agril. Botany, TNAU, Coimbatore delivered a lecture on 'Hybrid rice' on 18-5-1984.

Dr Nataraj, Sr Scientist, ISRO, Trivandrum delivered a lecture on "Satellite communication in Agriculture" on 30-5-84

Dr D Dale, Research Fellow, IRRI, Manila delivered a lecture on 'biochemical basis of host plant resistance' on 20-6-1984.

Dr Kishan Singh, Director, Indian Institute of Sugarcane Research delivered a guest lecture on "disease of sugarcane" on 11-6-1984.

Dr D J. Bhagyaraj, Associate Professor of Microbiology, University of Agril. Sciences, Bangalore delivered a lecture on "Importance of Mycorrhizae in Agriculture" on 18-8-84.

Dr D. Kleinar, Professor of Microbiology, University of Beyrouth West Germany delivered a lecture on "Metabolism of inorganic nitrogen in micro-organism" on 28-9-84.

A special lecture on "Nitrogen use efficiency was delivered on 14-8-84 by Dr S. Ramaiah, Professor of Agronomy, Agril. College & Res. Institute, Madurai.

A special lecture on "farming systems in Korea" was delivered by Dr S Subramoniam, Director, Advanced Centre for Soil and Crop Management studies, Tamil Nadu Agril University, Coimbatore on 29-10-84

Dr. B Chowdhary, Head of the Division of Vegetable Crops and Floriculture, IARI, New Delhi delivered a lecture on "Advances in Vegetable Research" on 7-1-1985

Dr. G Ramachandran, former Vice-Chancellor, Rural Institute, Gandhigram (Deemed University) delivered a speech on 18-1-1985 on "Youth and modernisation in Agriculture"

A special lecture on "Dryland Farming Technology" was delivered by Dr G. V Havanagi, Professor of Agronomy, UAS, Bangalore on 22-2-'85.

Dr MRGK Nair, Retired Professor of Entomology delivered a talk on the "Philosophy and ideals of Swami Vivekanda" on 23-1-1985

Academic Programmes

Strength of students under each course

	Men	Women	Total
UG Course			
I Year B.Sc. (Ag)	36	43	79
II "	28	22	50
III "	47	28	75
IV "	40	41	81
Total	151	134	285

No. of outside students with details of state/country/ programme etc			
Lakshadweep	4	—	4
Tripura	10	—	10
Pondichery	1	—	1
Andhra Pradesh	3	—	3
Shillong	1	1	2
New Delhi	1	—	1
Bhutan	3	—	3
	23	1	24

No. of students who obtained degree during the period	29	43	72

PG Courses

	Men	Women	Total
Strength under each course			
I Year M.Sc.	23	29	52
II ,,	24	29	53
	47	58	105
Ph D I Year	6	2	8
,, II ,,	3	3	6
,, III ,,	3	2	5
	12	7	19
No. of outside students (under USAID programme from Nepal)	2	—	2
No. of students who obtained degrees during the period			
M.Sc. (Ag)	6	10	16
Ph.D.	1	1	2
	7	11	18

Practical training programmes like earn while you learn, Kayal cultivation, work experience etc

With a view to acquire practical knowledge and to gain confidence in tackling field problems in the farm front, the work experience programme was instituted for the undergraduate students in Agriculture. The work experience programme included cultivation of tapioca, banana, pulses, vegetables, fodder maize and homestead farming. The final B.Sc. (Ag) students cultivated paddy during punchai season in Kayal lands. In addition to the above annual crops, all the students were allotted perennial crops during the first year and they maintained them properly till the end of the B.Sc. (Ag) programme.

Under the farm training programme, the final B.Sc. (Ag) students were assigned to various research stations of KAU in the Southern region to acquaint themselves with the activities of the stations during the final trimester under the direct supervision of the concerned officers in charge of those stations.

The final year students were also provided with opportunities for getting practical training under field situations in Agril. Development Projects. This programme, which was arranged and monitored by the Department of Agril. Extension was planned and conducted in collaboration with the State Department of Agriculture.

Study tours

The final year B Sc students were taken on an All Kerala Study tour to various research stations of the Kerala Agricultural University

The third year B Sc (Ag) students were taken on an All India Study Tour to different places and institutions of Agricultural importance in the country both in South and North India

Scholarships awards and aids to students

The following scholarships, aids and concessions were given to the students

1	National Merit Scholarship	39	Nos
2	National Loan scholarship	5	..
3	Educational concessions under KPCR	41	..
4	ICAR Merit-cum-means scholarship	23	..
5	ICAR Junior fellowship	19	..
6	ICAR Senior fellowship	12	..
7	KAU Merit scholarship	22	
8	KAU Fellowship	42	..
9	Educational concessions to Backward classes Welfare Dept of Andhra Pradesh	2	
10	Merit scholarship to the children of school teachers	6	..
11	USAID (New Delhi) for Nepal students	2	..
12	Educational concession to Tripura students	10	..
13	Educational concession to Lakshadweep students	4	..
14	Gandhi centenary Merit scholarship to the children of Bhilai Steel Plant employees	1	No
15	Scheduled caste students scholarship	43	Nos
16	Scheduled Tribes students scholarship	5	..
17	OEC (Christian converts)	1	No
18	Stipend to Bhutan students	3	Nos
19	Stipend to Meghalaya students	2	..
20	Post Metric scholarships (HRD)	2	..
21	Stipend for Village Level Workers admitted for BSc (Ag) course	9	..
	Total	295	Nos

Extra curricular/co-curricular activities

The Students' Union of this college functioned under the presidentship of Sri. R. Prakash, Ph. D. Scholar with Sri. M. K. Ravikrishnan, third year B. Sc. student as the General Secretary.

The following staff members held the offices noted against them:

Dr V. K. Sasidhar, President	—	Arts club
Dr G. Balakrishna Pillai, ,,	—	Speaker's club
Sri S. Pazhania Pillai ,,	—	Atheletic club
Dr Skariah Oomen ,,	—	Planning Forum and Social Service League
Dr N. Mohan Das, Staff Editor	—	College Magazine
Sri P. A. Rajan Assari, President	—	Camera Club

The activities of the students union for the academic year 1984–85 were inaugurated by Sri M. K. Joseph, Director General of Police, Kerala, and activities of the Arts Club were inaugurated by the Cine artist Sri Venu Nagavally.

NSS activities

Dr Skariah Oommen, Associate Professor, Animal Husbandry, Division and Sri P. A. Rajan Asari, Assistant Professor (Entomology) continued to be Programme Officers of the NSS Units of the College during the period under report. The college had a student volunteer strength of 260 inclusive of 135 women volunteers. The volunteers actively participated in various activities.

The Community centres of the NSS Units of the college at Kakkamoola and Muttakkad continued to function with facilities for reading news papers magazines etc. Facilities were also provided for indoor games.

A blood grouping campaign was organised on 2-5-1984 and a list of blood doners was prepared and kept to make blood donations as and when required. Thirty two NSS volunteers donated blood.

The volunteers helped in the conduct of antirabies vaccination campaign at Kakkamoola and a seminar on rabies and its control was held on 7-7-1984.

The NSS Unit of the College celebrated the United Nations Day on 24th October, 1984.

The NSS volunteers participated in the quiz programme arranged by Doordarsan Kendra, Trivandrum.

The NSS Units of the college observed the birth day of Swami Vivekananda on 12th January 1985 as the National Youth day and the period from January 12th to 19th as National Youth Week.

A special campaign programme of the NSS Unit was conducted from 11th to 15th August 1984.

Tournaments/Championships

Inter class competitions were conducted in all disciplines of sports. The college participated in Inter-collegiate tournaments in Basket Ball

(W & M), Volley ball (M & W), Ball badminton (M & W), Tabole Tennis (W & M), Cricket (Men), Hockey (Men) and Athelelics (M & W). Kerala Agricultural University athelelics for the year 1983 84 was held in this college on 25th and 26th August 1984. The men and women teams of this college were the champions in K. A. U. Athletics boths men and women. The college teams were the winners in Foot ball (Men) and Ball badminton (Men).

The college teams were the runner up in Volley ball (Women), Ball badminton (Women) and Shuttle badminton (Men).

Open tournaments in table tennis for men and women were conducted. The college team participated in Dr Seelabhadran Memorial Foot ball tournament held at Medical College, Trivandrum. Exhibition matches were conducted in Volley ball, Basket ball and Foot ball in the college grounds.

Hostel:

Dr N. Sadanandan continued as the Warden of the three hostels attached to the college. Sri P. Chandrasekharan was the Assistant Warden of P. G. Hostel and Sri S. Pazhania Pillai and Smt Saradamma were the Assistant Wardens of UG and Women's Hostel respectively. There were 251 students in the hostel (132 Boys + 119 Women) against the total strength of 299 in the College.

College Library

During the year, 141 new books were purchased making the total books in the library as 20368. There are 117 subscribed journals including 58 foreign journals.

Lab to Land programme

As part of the Lab to land programme, two days training in Bee Keeping as well as fruit and vegetable preservation was imparted to selected farm youth of Muttakkad and Kalliyoor villages on 28th and 29th May, 1984. Inputs worth Rs. 4,525 – were supplied to the beneficiaries of Lab to Land programme during the year.

Village Adoption Programme

Twenty Front Line Demonstrations with gingelly variety 'Thilothama' were conducted during the third crop season in paddy fields. One knapsack sprayer was purchased and issued to the farmers for their use. One seminar on gingelly cultivation was arranged at Muttakkad and Kalliyoor villages during the period.

A rodent control campaign was organised and conducted in Muttakkad Village during the year. A campaign on preventive measure against rabies in dogs was also organised and conducted in Muttakkad village.

Exhibition & Seminar

An exhibition on different aspects of post harvest technology of cassava was organised at CTCRI in which the Home Science Department of this Institution participated.

A one day seminar on 'Career guidance' was organised at Vellayani under the auspices of ihe Employment Information and Guidance Bureau of Kerala Agricultural University.

Strike by Students

The students of this college were on strike during March 1985 and the college was closed from 11th March.

Publications etc.

Based on research conducted in the various disciplines of this Institution, several scientific papers have been published in leading research journals. Several popular articles were also published in newspapers and magazines.

Based on the research results, several recommendations were also made for inclusion in the package of practices published by the Directorate of Extension, Kerala Agril. University.

Visitors

Several reputed scientists and public men visited this Institution during the period under report. They included Sri A. L. Jacob, Minister for Agriculture, Kerala State, Sri Vakkom B Purushothaman, Ex. Speaker, Kerala Assembly, Dr G. Ramachandran, former Vice-Chancellor of Rural Institute, Gandhigram etc.

Besides the above, pupils from schools, students from different colleges inside and outside state, farmers etc. visited this Institution.

Instructional Farm

The Agricultural College Farm, Vellayani was established during the year 1954-55. The total area of the Farm comprises of 75 ha of garden land and 165 ha of kayal lands.

With the inception of the Kerala Agricultural University in 1972, the Agricultural College Farm, Vellayani was converted as Instructional Farm attached to the College of Agriculture, Vellayani with the object of imparting field training to the undergraduates postgraduates and other diploma students in the field of Agriculture.

The main crops cultivated in the garden lands of the Farm are coconut (20 ha), rubber (2 ha), banana (10 ha), paddy (5 ha), mango (10 ha), guava (1 ha), sapota (0.50 ha), bread fruit (0.50 ha), jack (0.50 ha), nutmeg (1.50 ha), and clove (0.50 ha etc). The rest of the area is occupied by roads and buildings. The important activities of the Farm are centred around the following aspects.

Production and distribution of (i) quality coconut seedlings

ii) Grafts, layers and other seedlings of fruit and other ornamental plants

iii) Vegetable seeds

iv) Ornamental plants.

Mamtenance of varietal collection of banana and

Partic pation in fairs and exhibitions in and around Trivandrum city

Production of a dwarf type, high yielding and early bearing variety of coconut "Komadan", a sweetish jack variety of Muttan vanikka are some of the monopolies of this Farm

In the kayal lands attached to this farm, a single crop of paddy is raised during the punja season i e from December to May, by dewatering the kayal lands

During the year under report, 1,48,134 coconuts have been produced and sold 2183 Komadan, 7027 West Coast Tall coconut seedlings were distributed 1713 kg of Rubber sheets and 197 kg Rubber wash were sold 28.12 tons of paddy seeds were distributed and 43.4 tons of straw were sold. 3.7 tons of Banana were produced and sold. 9841 grafts were produced and distributed In addition large number of layers and seedlings were also produced and distributed from the farm. Vegetable seeds and ornamental plants were also produced and distributed from farm

Livestock Farm

The quantity of milk produced was 44452½ litres with an average of 123.4 litres/day The total production of eggs were 27,590 Nos with an average of 76 Nos day. 1784 animals were treated in the hospital and pregnancy diagnosis conducted in 84 animals. 148.11 tonnes of fodder was produced

1.2 COLLEGE OF HORTICULTURE, VELLANIKKARA

Location

The College of Horticulture is situated in the main campus of the Kerala Agril. University at Vellanikkara, 10 km from Trichur town, on Trichur-Palghat Road.

Year of establishment

The College was established on 28th October 1972 and was temporarily located at Mannuthy. It was shifted to the new academic buildings in the main campus during November 1977.

The area of the College campus is 95.3 ha comprising of the Instructional Farm at Vellanikkara.

Dr P. K Gopalakrishnan continued as Associate Dean of the College Fifteen Departments viz, Pomology and Floriculture, Olericulture, Plantation Crops & Spices, Processing Technology, Agronomy, Soil Science & Agril. Chemistry, Agril Botany, Agricultural Entomology, Plant Pathology, Agril Engineering, Agricultural Extension, Agril. Economics, Agril Statistics, Agrometeorology, and Physical Education continued to function in the College during the year. Besides these academic programmes, the following research schemes/projects were also taken up in the College.

Kerala Agricultural Development Project

All India Co-ordinated Project for Improvement of Tuber Crops other than Potatoes

Scheme for the Investigation of Research on Sugarcane of Kerala

All India Co-ordinated Research Project on Biological Control of Crop pests

Pepper Research Scheme and
Coconut Root Wilt Scheme

New posts sanctioned during the year

The following posts have been created for the Man Power Development Scheme of Coffee Board with effect from 26-9-1984.

Professor (Horticulture)	1
Asst. Professor (Horticulture)	1

One post of the Director, Centre for Humid Tropical Tree Crops and Environmental Horticulture was sanctioned

Posts shifted/abolished during the year

The Instrumentation Centre of the College was bifurcated and Sri P.R. Chandrasekharan, Instrumentation Engineer was transferred to College of Veterinary and Animal Sciences, Mannuthy with effect from 2-11-84

Changes in personnel due to new appointments, transfers etc.

Dr M. Aravindakshan, Professor of Horticulture, was appointed as Director of the Centre for Humid Tropical Tree Crops and Environmental Horticulture and he joined duty on 24-8-84

Faculty Improvement Programme

Sri M. V Rajendra Pillai, Asst. Professor was granted study leave for two years with effect from 11-4-84 under this programme.

Details of staff returning after higher studies

Dr J. Thomas, Asst. Professor reported for duty in the Department of Agronomy with effect from 8-11-84 after the completion of the post doctoral research in U. K. Dr C. Ramachandran, joined duty as Asst.

Professor in the Department of Plantation Crops and Spices on completion of post doctoral research in U K on 27-11-84

Details of staff deputed for Seminars/Symposia

Dr K. M Rajan, Professor of Pathology and Sri Jippu Jacob, Asst. Professor were deputed to the University of Mysore for studying the construction and operational details of air sampler for two days during January 1985

Dr K Mukundan Associate Professor (Agrl. Economics) attended the 4th Annual Conference of the Indian Society of Agricultural Engineering and participated in the combined annual workshop of the ICAR Co-ordinated Projects on Agricultural Drainage and Wells and Pumps held at the Institute of Hydraulics and Hydrology, Madras during 27th to 29th November 1984

Smt Baby Lissy Markose, Jr Asst Professor was deputed for the training programme on post-harvest technology of fruits and vegetables at Indian Institute of Horticulture Hessarghatta, Bangalore from 12-10-84 to 26-10-84

Dr J. Thomas, Asst. Professor (Agronomy) attended the Golden Jubilee Celebration of the Indian Society of Soil Science at New Delhi from 7th to 10th December 1984.

Sri K. John Thomas, Professor (Agrl Engg) Sri M. Sivaswamy, Asst. Professor attended the ICAR XIV annual workshop of the Co-ordinated Scheme on Research and Development of Farm Implements and Machines and production of prototypes and evaluation under different agro-climatic conditions held at Central Institute of Agricultural Engineering, Bhopal from 21st to 24th January 1935

Dr P. K. Gopalakrishnan, Associate Dean, Dr M. Aravindakshan, Special Officer and Head of the Department of Pomology and Dr C. Sreedharan, Professor & Head of the Department of Agronomy and Sri S. Balakrishnan, Professor of Horticulture, MSCRP were deputed to visit Manipur and advise on Horticultural development and the organisational set up of Manipur Agricultural College from 12th to 22nd September 1984.

Dr K. V. Peter, Professor and Head of the Dept. of Olericulture participated in the Seminar on Genetic Engineering Research in India and Breeding for Stress Resistance in Crop Plants on 12th and 13th October 1984 at Haryana Agricultural University, Hissar.

Datails of Seminars/Symposia/Extension lectures/Training Programmes/Correspondence course, etc. conducted by the Institute

A training Programme on Processing and Preservation of Fruits and Vegetables for the labourers of University was conducted by the

Department of Processing Technology. A short-term training of Plantation Crops for the Junior Agricultural Officers of the Agricultural Department was organised from 15th to 20th October 1984. A new extension project "Free horticultural therapeutic aid" under the leadership of Dr G. S. Nair. Professor of Horticulture was inaugurated at Pope Paul Mercy Home, near Trichur for the mentally retarded children on 8-12-84.

A training in tree planting and maintenance was conducted for the Railway staff members from 30-7-1984 to 4-8-1984.

A syllabus was prepared and handed over to the University for the correspondence course on ornamental gardening proposed to be conducted by the University shortly.

Five batches of Agricultural Officers and two batches of Agricultural Demonstrators were given training on vegetable production for a period of seven days.

One day training on bio-control of salvinia for the SMS (PP) of the Department of Agriculture was conducted on 16-1-85. A training in cropping system was organised for the benefit of the Assistant Directors of the Department of Soil Survey.

One day training on parasite breeding and biocontrol was organised at Parasite Breeding Station, Manancherry, Malappuram on 15-2-85.

Academic programmes

Strength of students under each course

i) U G. Course

B.Sc. (Ag.) Degree Programme

Year of admission	Men	Women	Total
1st year (1984 admission)	37	43	80
2nd year (1983 admission)	30	24	54
3rd year (1982 admission)	32	24	56
4th year (1981 admission)	52	28	80
Total	151	119	270

No. of outside students with details of State Country programme etc. B.Sc. (Ag.) Degree programme

Name of the country	Male	Female	Total
Nepal	—	2	2
Sudan	6	—	6
Total	6	2	8

No. of students who obtained their degrees during the period

	Men	Women	Total
B Sc (Ag)	14 + 6 (20)	15 + 19 (34)	54
B Sc (Hort)	—	2	2
Total	20	36	56

ii) P G Courses

Strength of students in each course

M Sc (Hort) Degree programme

Year of admission	Men	Women	Total
1st year (1984 admission)	1	6	7
2nd year (1983 admission)	Nil	3	3
Total	1	9	10

M Sc (Ag) Degree programme

Year of admission	Men	Women	Total
1st year (1984 admission)	14	17	31
2nd year (1983 admission)	8	10	18
Total	22	27	49

Ph.D (Hort)

Year of admission	Men	Women	Total
1st year (1984 admission)		2	2
2nd year (1983 admission)	—	—	—
3rd year (1982 admission)		—	—
Total		2	2

Ph. D (Ag)

Year of admission	Men	Women	Total
1st year (1984 admission)	1	3	4
2nd year (1983 admission)	2	—	2
3rd year (1982 admission)	2	1	3
Total	5	4	9
Grand Total	28	42	70

No.of students from other States Country: Nil

No.of students who secured degrees during the period

	Men	Women	Total
M. Sc. (Ag)	7	2	9
M. Sc. (Hort)	10	7	17
Total	17	9	26

iii) Practical training programme

Besides regular practical classes in the laboratories and in the field, the undergraduate students were given training in the cultivation of various annual crops, maintenance of perennial crops and processing of agricultural and horticultural produces through various work experience courses.

iv) Study tours

The undergraduate students of second and third year visited places of Agricultural importance all over the state and all over the country respectively.

v) Scholarships, awards and aids to students:

Name of scholarship/award/aid	No. of recipients
National merit scholarship	32
Need cum merit scholarship	13
University Merit scholarship	11
KAU Fellowship	23
ICAR Junior Fellowship	26
ICAR Senior Fellowship	6
Stipend to Nominees of Andoman & Nicobar islands	3
Stipend to Tripura nominees	8
Stipend to Nepalese students	4
Stipend to Lakshadweep students	6
Stipend to nominees of Pondicherry	1
Stipend to nominees of Arunachal Pradesh	1
District-wise merit scholarship	5
Educational concessions SC/ST	33
KPCR	42
Christian converts	7
Fellowship by Rajasthan Mineral Development Corporation Ltd.	1
Potash Research Institute	1

vi) Extra-curricular Co-curricular activities

Students of the College actively participated in activities connected with sports and games, arts club, quiz club, social service league, and planning forum. These activities were undertaken by the Students' Union. In addition, they participated in the National Service Scheme Village Adoption Programme, Lab to Land Programme and other extension programmes organised by the University

vii) Hostel

Dr S. Ramachandran Nair continued as Assistant Warden till 17-4-84 and thereafter Dr P. Varadarajan Nair took charge as Assistant Warden of of the Men's Hostel

Smt. K. C. Marykutty continued as Assistant Warden till 31-3-1985 and there after Dr (Mrs) Sosamma Jacob took charge of the post

The total strength of the hostels were 350, of which 185 boys and 165 ladies.

College Institute Library Books, Journals as on

	1-4-1984	31-3-1985
Books	19,587	20,842
Journals		119
Indian		85
Foreign		

Book Bank Scheme

Under the scheme, 263 books were purchased and issued to the students, collecting 50% of the cost from them.

Exhibition conducted : Nil

Instructional Farm

Instructional Farm, Vellanikkara - Total area 95.35 ha.

Crop coverage

Coconut (Inter crop – Banana)	30 ha
Mango	4 ha
Guava	1.1 ha
Citrus	0.5 ha
Sapota	0.75 ha
Pineapple	0.8 ha
Nutmeg	2.2 ha
Cocoa	2.15 ha
Cinnamon	1.40 ha
Clove	1.25 ha

Average yield

The crops are at a very early bearing stage. Hence a reliable estimate on average yield could not be obtained.

Vacant land : 4.0 ha

Other matters

College day, Hostel day and Youth Festival were celebrated.

The students were on strike from 5-3-85.

Visitors to the Institution

Sri K. A. Issac, Head of the Department of Library Science, University of Kerala.

Dr. O. P. Dutta, Head of the Department of Vegetable Crops, IIHR, Bangalore.

Dr. Ramaiah, Professor and Head of the Department of Agronomy, College of Agriculture, Madurai.

Dr. V. S. Seshadri, Co-ordinator (Vegetables), IARI, New Delh.

Dr. B. Chowdhury, Head, Division of Vegetable Crops, IARI, New Delhi.

Dr. S. Subramony, Director, Soil and Crop Management Studies, Coimbatore.

1.3 INSTITUTE OF AGRICULTURAL TECHNOLOGY, TAVANUR

The Institute of Agricultural Technology, Tavanur is located in Tavanur Village of Malappuram district about 7 kilometres from Kuttippuram Railway Station and 12 kilometres from Ponnani. The Institute was established during the year 1963 as Rural Institute and offered various Diploma and Certificate courses. The Institute was taken over by the Kerala Agricultural University with effect from 12-12-1975. The Institute was renamed as "Institute of Agricultural Technology" in 1977.

The Institute is at present offering two Diploma courses, viz. Diploma in Agricultural Sciences (DASc) and Diploma in Agricultural and Rural Engineering (DARE). In addition to this, training programme to the Agricultural Demonstrators of the Department of Agriculture is also conducted.

The IAT Campus has an area of 40 hectares, of which, the Instructional Farm convered 26 hectares. A Dairy Unit and an Artificial Insemination centre are also attached to the Instructional Farm. The institute is a sub-centre of the Northern Zone under NARP.

Sri. K. Karunakaran, Director retired from service on superannuation on 31-3-1984. Sri. C. P. Muhammed, Associate Professor (AE) is holding full additional charge of the post of Director from 1-4-1984 onwards and still continues during the period under report.

Dr. C. K. Sreedharan Unni, Assistant Professor (AH) has been transferred and posted in the College of Veterinary and Animal Sciences, Mannuthy. He relinquished charge of the post in the Institute on 25-6-84.

The post of Administrative Officer on Rs. 910-1550 has been created for the Institute. Smt. K. Padmavathy assumed charge of the post on 7-6-84.

The vacant post of Section Officer was filled up by posting Sri A. K. Sreenarayanan. He assumed charge of the post on 16-5-1984.

The post of Junior Assistant Professor (Civil Engg.) in the Institute was filled up by posting a provisional hand. He assumed charge of the post on 19-5-84.

The post of Assistant Professor (AH) was filled up during 7/84. Dr. H. Subramanian assumed charge of the post of Assistant Professor (AH) on 9-7-84.

Dr C M Aravindakshan, Junior Assistant Professor (AH) was transferred and posted in the College of Veterinary and Animal Sciences, Mannuthy. He was relieved of his duties in the Institute on 10-10-1984

Sri C P Muhammed, Associate Professor was appointed as Professor (Ag Engg) and posted against the post shifted from the College of Horticulture, Vellanikkara to this Institute. He assumed charge of the post on 1-9-84 He is also holding full additional charge of Director of this Institute

Smt K Padmavathy, Administrative Officer was transferred to KAU Hoadquarters She was relieved of her duties on 11-2-85 AN Sri O. Vinodakrishnan, Section Officer is holding full additional charge of Administrative Officer till date

Seventeen posts of teaching staff and 15 posts of non-teaching staff were vacant during the period under report.

None of the teaching staff was deputed granted study leave/leave for study purpose during the period under report.

None of the staff members returned to this Institute after higher studies.

Academic Programme

The following courses were in operation at this Institute at the beginning of the year:

VIII	batch of DASc.	with students strength of	50
IX	-do-	-do-	17
III	batch DARE	-do-	23
IV	-do-	-do-	16
			106

Study tours

A study tour for the students of VIII batch of D. A. Sc., was conducted during the period from 28-5-84 to 2-6-84 to places of Agricultural importance such as RARS, Pattambi; Livestock Farm, Thiruvazhamkunnu, RARS, Ambalavayal; Rippon Tea Factory, Meppadi; Coffee Board Robusta Research Station, and Cadbury Fry India Ltd., Kalpetta, CPCRI, Peruvannamuzhi, Pepper Research Station, Panniyur, CPCRI, Kasaragode and RARS, Pilicode.

During the second quarter of the said period, the shortage of teaching staff was an acute problem especially in the disciplines of Agricultural Engineering; Agricultural Economics and Agricultural Entomology. The only Junior Assistant Professor specialised in the discipline of Plant Pathology entered on leave during this period.

The classes were suspended for all the batches of students with effect from 28–10–84 following a seuffle between two factions of students.

The classes resumed on 7-1-85 for the VIII and IX batches of DASc., and III and IV batches of DARE. A study tour was conducted for IX batch DASc., on 9-2-85 to FACT, Alwaye.

The IV trimester of IX DASc., and IV DARE commenced on 18-2-85 along with the 1st trimester of X DASc., (60 students) and V DARE (19 students). Due to the shortage of teaching staff at the Institute, course teachers for Agricultural Economics were arranged from RARS, Pattambi and Horticultural College, Vellanikkara, for Plant Pathology from Horticultural College and for Animal Husbandry from Communication Centre, Mannuthy, for Agrl. Engineering from Horticultural College on working arrangement during the period.

At the end of 31-3-85, the following courses were in operation with student strength as given:

VIII	DASc.	with a strength of	50
IX	do	do	16
X	do	do	60
III	DARE	do	17
IV	do	do	14
V	do	do	19
			176

	Men	Women	Total
No. of outside students with details of State/Country/ Programme etc.	8 for DASc., IV & V batch	nil	8
	4 for DARE	..	4
	Grand Total		12*

	Men	Women	Total
No. of students who obtained DASC	46	Nil	46
their Diplomas during the year DARE	24	Nil	24

PG courses were not offered by this Institute

Extra-curricular/Co-curricular activities:

Date	Event
15-5-84	1. Valedictory function of IAT Students' Union 1983-84
	2. Institute Day
20-5-84	Election to IAT students Union 1984-85
20-7-84	Inaugural function of the IAT Students' Union 1984-85
21-7-84	1. Inauguration of IAT Arts Club 1984-85
	2. Inter-class Quiz competitions.
22-3-85 & 23-3-85	Youth Festival organised by IAT Students' Union

* All candidates belong to Union territory of Lakshadweep

Photographic Club

Practical training in handling camera and dark room works were imparted to 15 students of the Institute. The duration of this training programme was two months (January 85 to February, 85)

Tournaments, Championships etc.

Inter-College participation

Twenty one athlets participated in the KAU Athletic Meet held on 25th and 26th August 84 at Vellayani. They secured places in the meet as noted below:

Event	Name of student	Place obtained
1 Polevault	Sureshkumar	2nd
2 Discus throw	Valsan	3rd
3 1500 metre race	-do-	3rd

IAT Football team participated in the KAU Inter-collegiate tournament held at Mannuthy on 12th and 13th July, 1984. The Cricket team participated in the inter collegiate tournament held at Trichur on 7-8-1984.

Practice matches

In order to improve the performance and to obtain experience a series of practice matches were arranged during the year. The Institute Volleyball team participated in the tournament held at Moorkanadu near Valanchery on 23-2-85. The Shuttle badminton team won second prize in the Shuttle tournament held at Thirunavaya during March, 85.

Shuttle club

Action has been taken for the formation of IAT Shuttle Club consisting of both students and staff members.

Hostel

Sri A. P. Gopalakrishnan, Research Assistant, continued as Asst. Warden upto 31-1-1985 and thereafter Sri P. Ahamed, Assistant Professor, took charge as Asst. Warden.

There are 130 men students in the hostel attached with the Institute.

Library

Institute Library

a) No. of books purchased during the year	142
b) Total no. of books as on 31-3-1985	14,765
c) No. of new journals added	20
d) Total no. of journals as on 31-3-1985	49

Scholarships, Awards and Aids to students

1)	KAU Merit scholarship	12 students
2)	Harijan Welfare awards	18 students
3)	KPCR	52 students
4)	Union Territory of Lakshadweep	3 students

Instructional Farm:

The following activities were undertaken.

Daincha & Kolinji were raised *in situ* in fields and incorporated in the fields for organic matter.

Paddy – First crop paddy was raised and— a total of 42.020 tons of paddy was produced during the year.

Coconut — Yield obtained was 29106 nuts.

Banana — 4000 kgs of banana was harvested from 600 plants.

Vegetables – A total quantity of 2036 kg. of vegetables were produced and distributed.

By auction sale of tapioca, arecanut, tamarind, pepper, ceiba pods and jack fruits, a revenue of Rs. 7120/- was realised during the year

Animal Husbandry wing

The year of 1984-85 was the year of busy Animal Husbandry activities Several steps were taken to activate and develop the drowsy Animal Husbandry wing of IAT Campus The following were the improvements in the several fields of Animal Husbandry.

i) Dairy Farm

For increasing milk production of any dairy farm good quality feed and fodder must be available for feeding the livestock. Hence, as an initial step to increase milk production, 10,000 slips of guinea grass were procured from Fodder Research Station, Mannuthy and planted at the IAT Farm.

Five milking cows were brought from Livestock Farm, Mannuthy to meet the needs of milk of residents of IAT campus.

The floor and manger of the Dairy Farm were repaired.

Seven milking cows were purchased for the IAT Dairy Farm.

Several steps were taken to control the infertility problem in Dairy Farm, which helped to increase the number of pregnant animals in the farm.

A good drainage canal for draining the water of the Dairy Farm was constructed

The herd strength of the Dairy Farm was 50.

The total milk production in the Farm was 94 lits/day

The average milk production was 8.0 lits/day.

ii) Poultry Farm

During October, 1984 Poultry farm consisting of 200 white leghorn laying birds was started.

During November, 1984 broiler chicks were brought to IAT Poultry Farm as an initial step to rear broiler chicken for commercial use.

In December 1984, the farm was further strengthened by adding 100 white leghorn layers and 4 australop males.

The present stock of poultry including broiler birds is 500 at present.

The poultry farm sells nearly 150 table eggs/day and 25 australop white eggs (hatchable) day and 160 nos of broiler chicken every month.

Veterinary Hospital

The Veterinary Hospital of IAT campus is offering good service to the public by treating the animals free of cost. Artificial insemination in cattle and buffaloes are also being conducted at present.

A total number of 2315 animals were treated during the year which consisted of 1574 bovines, 440 caprines, 278 avians and 23 canines.

A good Murrah breedable buffaloe was brought to IAT Farm from Animal Reproduction Department of Veterinary College to perform buffaloe insemination at the IAT campus.

A total number of 125 animals were inseminated during the year.

Extension activities

A large scale Livestock show with the participation of all kinds of domestic animals was organised at IAT, Tavanur, on 10-3-1985. The livestock show was inaugurated by Hon. Minister for Civil Supplies, Mr. U. A. Beeran. The meeting was presided over by Sri. C. Haridas, M. P.. The welcome address was given by Dr. A. G. G. Menon, Director of Extension and felicitations by Dr. M. Krishnan Nair, Dean, Veterinary & Animal Sciences, Sri P. K. Kuttan and Sri. E. C. Panicker.

A mini exhibition depicting the latest viable technologies in fields of Animal Husbandry was also arranged and over 1000 villagers visited the exhibition stall. The sale receipt exceeded Rs. 2000 - in the exhibition stall which functioned only for four hours on that day.

Other activities:

Pisciculture (fish cultivation) was started in the existing ponds. The fingerlings of varieties of fishes, eg., Cutla, Roher and Mrugal were obtained from the Fish Breeding Station, Parappanangadi (Fisheries Department, Govt. of Kerala). Nearly 300 fingerlings were distributed in various ponds.

Lab to Land Programme:

Fifty farm families in Tavanur village have been selected as beneficiaries of Lab to Land Phase III programme during 1984–85. In selecting the families, cluster approach was adopted and special consideration was given to the landless labourers (18 nos) and marginal farmers (20 nos) mostly belonging to scheduled castes (13) and backward communities (34).

Bench Mark survey of all the farm families was conducted and production plans were prepared to Improve the economic conditions of the selected families. A mixed farming approach based on individual homesteads, incorporating agriculture, animal husbandry and cottage industries was planned for the development as well as for providing supplementary source of income to the families. For the proper co-ordination of the programme, two group leaders were selected from among the selected families.

A 'Kisan Mela' and a 'Livestock Show' were organised jointly at the Institute of Agricultural Technology, Tavanur on 10-3-1985. These programmes were inaugurated by Sri U. A. Beeran, Hon Minister for Food and Civil supplies at a public meeting presided over by Sri C. Haridas, M. P. The inaugural function was followed by a Livestock Show, in which more than 1000 cattles were brought for the show. An exhibition was also arranged as part of the Kisan Mela.

Though it is too early to assess the impact of the programme now, it could be noticed that about 25 she-goats have started giving milk to the families at the rate of 0.5 litres per day. The australwhite birds will start laying eggs from the month of May 1985 onwards.

Sterility Camp.

A sterility camp was organised for the benefit of cattle in the adopted village, Tavanur on 10-3-1985 and over two hundred sterile animals were examined in detail by the experts from the Veterinary College, Mannuthy. It was noticed that majority of animals possessed undeveloped genetalia especially in heifers due to malnutrition. Infection of uterus was noticed among animals and 12 animals were not conceiving due to suspected delayed ovulation. Necessary drugs were also administered to the animals free of cost.

Parasitic Examination Camp

A parasitic camp was conducted along with the livestock show under Village Adoption Programme of the Institute and a total number of 74 animals were examined for the presence of parasites. The interesting feature of the camp was that over 52% of animals were found positive for varieties of parasites, the important type being blood-sucking hookworms. Medicines for de-worming were supplied free of cost.

Training scheme

A pre-service training course for the Agricultural Demonstrators of the Department of Agriculture was conducted at this Institute during the period from 4-6-84 to 3-12-84 52 agricultural demonstrators enrolled for the training course Out of the 52 demonstrators enrolled for the training course, 40 trainees came out successful The consolidated statement of the results were forwarded to the Director of Extension for approval

Visitors

Sri U. A Beeran, Hon. Minister for Food and Civil Supplies, Govt. of Kerala, Sri C Haridas, M P , and Sri A V Hamza, Member, KAU Executive Committee visited the institute on 10-3-85 in connection with the conduct of Kisan Mela and Livestock Show at the Institute

1.4 COLLEGE OF CO-OPERATION & BANKING

As per section 5 of the KAU Act 1971, the 22nd meeting of the Academic Council of the University held on 7-11-80 had recommended the starting of a Four Year Degree Programme in Co-operation and Banking. The General Council of the University in its 21st meeting held on 20/21-11-80 approved the resolution of starting the Four Year Degree Programme in Co-operation and Banking from the academic year 1981-82 onwards. Accordingly the B Sc. (C & B) programme was started in 1981 in the College of Horticulture, Vellanikkara.

Dr C. A. Jos, continued to be the Head of the B.Sc. (C & B programme.

The project report based on the revised objectives of the B.Sc. (C & B) programme was placed before the 32nd meeting of the Academic Council held on 8-9-1983. The report was referred to the Board of studies in Agriculture for detailed examination Besides the academic programmes, the following projects have been taken up in the college:

"Sickness in the Seafood Exporting Units-investigation with special reference to Commercial Bank Financing"

"Poverty in Kerala—A case study of Kurichikkara village in Trichur District".

"Concurrent Evaluation of IRDP— Malappuram District".

"Impact of Development projects in the Western Ghats Region on the Forest Dependent Population—A case study of Wynad District in Kerala". The project is funded by the Department of Environment, Government of India. The project is for a period of 3 years from January 1982 to December, 1985.

New Projects started during the year

Sanction has been accorded by the University to undertake a project titled "Evaluation of Peoples' Dairy Development Project, Kalady" for a period of six months funded by People's Dairy Development, Kalady.

Staff

The scientific staff composed of—Professor-1; Assoc. Professors-3; Assistant Professors-6 and Junior Assistant Professors-2 (including 1 JAP Provisional) in Banking. The details of the scientists are furnished separately.

New posts sanctioned during the year

The following teaching posts were newly created for the C & B programme.

Sl. No	Name of posts	Scale of pay	No. of posts
1.	Associate Dean	Rs. 1650—2175+ Spl. pay Rs. 150/-	1
2.	Associate Professor (Quantitative methods statistics)	1200—1800	1
3.	Assistant Professor	800—1600	
	a) Co-operation		2
	b) Banking		2
	c) Management		3
	d) Commerce		2
	e) Agrl. Extension		1
	f) Agrl. Statistics		1
		Total	13

Changes in personnel by new appointment, transfer etc.

Dr. C. A Jos, Associate Professor (Co-operation) was appointed as Professor (Co-operation).

Sri. T. Paranjothi, Junior Assistant Professor (Co-operation) and Sri. James Manalel, Junior Assistant Professor (Banking) were appointed as Assistant Professors of Co-operation and Banking respectively. Dr. N. Rajan Nair was appointed as Associate Professor (Commerce). Dr. U Ramachandran, Dr Tharian George K., and Dr. K A Suresh were appointed as Assistant Professors of Economics. Dr. Sreekumar Sreedharan, Associate Professor (Commerce) was granted leave to take up employment abroad.

Details of Seminars Symposia / Extension lectures Training programmes Correspondence course, etc., conducted by the Institute

Nil

Seminars/Symposia Workshop attended

The Special Programme for University and College Teachers in Co-operation conducted by the Vaikunth Mehta National Institute of Co-operative Management, Pune from 16th to 25th May 1984 was attended by Sri Philip Sabu, Assistant Professor. Dr. C. A. Jos, Professor (Co-operation) attended the 5th National Convention of the Indian Society for studies in Co-operation held at Pune from 20th to 22nd October, 1984. The National Programme on Co-operative Law as an instrument of Management held at Vaikunth Mehta National Institute of Co-operative Management, Pune from 4th to 6th February, 1985 was attended by Sri. T. Parampalli, Assistant Professor.

Academic Programmes

Strength of students: B.Sc. (C.S.B.) programme

Year of admission	Men	Women	Total
I year (1984 admission)	17	7	24
II year (1983 admission)	15	13	28
III year (1982 admission)	12	14	26
IV year (1981 admission)	31	20	51
Total	75	54	129

Outside students :

Only one student is from outside the State and he is hailing from Lakshadweep.

No. of students who obtained degrees during the year :

Nil.

Practical training programme :

The 1982 admission students were given practical training in th 'Management of Consumer Co-operatives' by placing them in the Keral Agricultural University Co-operative Society Ltd., from 25-2-1985 t 6-3-1985.

Study tours :

The 1981 admission batch was taken for All India Study Tour fror 12th March 1985 to 3rd April 1985. The 1983 admission students ha All Kerala Study Tour from 23rd March 1985 to 30th March 1985.

Scholarships, Awards and Aids to students :

	Name of scholarship/Aid	No. of Recipient
1.	National Merit Scholarship	1
2.	Merit Scholarship (Districtwise)	1
3.	ICAR Post-Metric Scholarship (HRO Programme)	1
4.	KAU Merit Scholarship	14
5.	Educational Concession to the students of Lakshadweep	1
6.	Educational Concession to SC/ST students	9
		27

Extra-curricular/Co-curricular activities:

NSS Activities

In May, 1984, the NSS Unit of the College conducted a House-hold Survey in the Kurichikkara village covering 100 families around the Mattampuram Laksham veedu colony and identified and enrolled 25 families as beneficiaries of the Lab to Land programme. The N S S volunteers of the College came forward to donate blood to some needy patients. The International Literary Day was celebrated on 8th September 1984 by visiting the farmers of the adopted village and assisting them in filling the questionnaire relating to the Lab to Land Programme. In connection with the Human Rights Day Celebration on 10th December, 1984, a symposium on 'Human Rights' was organised. As part of the International Youth Year, the International Youth Week Celebrations were inaugurated on 19th January, 1985 and on 21st January. Competition in Essay writing, Elocution and Music were organised under the joint auspices of College of Horticulture and College of Co-operation and Banking.

Self Improvement Programme:

The main objective of the programme is to impact education in specific areas to the students of B. Sc. (C & B) and to equip them to appear for various competitive examinations confidently.

Admission to this programme is restricted to those students who secure an OGPA of 3.50 4.00 by the end of their second year examinations. Accordingly 12 students of the 1981 admission were selected and were given training continuously from the III trimester of the III Year to the II Trimester of the IV Year (1984-85).

As part of the training, guest lectures were arranged on different areas such as General Science, History, Indian policy and Economy, English etc. Guest lecturers were drawn from different institutions including experts from the KAU.

A special class on 'Interview Techniques' by Prof. Ramachandra Poduval of University of Cochin was also arranged.

Test papers were conducted on the pattern of various competitive examinations.

A library has also been built up with periodicals, journals and books intended to impart General Knowledge and to familiarise the students with current events.

The programme for the present batch would be over when the final year B. Sc. (C & B) students complete their course work by July, 1985.

Visitors to the Institution

Thomas Valappil, Manager, Foreign Exchange Department, South Indian Bank, Trichur

Prof N S Ramaswamy, Indian Institute of Management, Bangalor
Dr P K Gopalakrishnan, Member, State Planning Board
Sri E Chandrasekharan Nair, Ex Minister
Dr M A Oommen, Professor, University of Calicut

1.5 REGIONAL AGRICULTURAL RESEARCH STATION, PILICODE

Research work on coconut commenced in Kerala with the establishment of 4 research stations (Nileshwar 1, 2, 3 and Kasaragod) in the Kasaragod taluk of the South Kanara district in 1916. Regular experimental work commenced in these Stations from 1930. In 1972, when the Kerala Agricultural University came into existence, the research stations at Nileshwar 1 and 2 were brought under the University. These stations were re-organised with the Headquarters at Pilicode in the year 1981 under the National Agricultural Research Project with the objective of solving the location specific farming problems in the northern zone of Kerala.

Altogether, the station has a land area of 56.90 ha of which 4.00 ha are wet lands and 52.90 ha are garden lands.

The important crops grown are coconut (44.9 ha), rice (63.30 ha in 2 seasons) cashew (1.0 ha), fodder (1.0 ha) and pulses (1.5 ha). The entire land area is effectively utilised for crop production.

Dr R. R. Nair, continued to officiate as Associate Director of Research of the station during the year.

Smt A. Naseema was awarded the ICAR Senior Fellowship in Plant Pathology.

During the year, two KAEP-NARP workshops were couducted on 24th August, 1984 and 14-15 March, 1985. The Annual Group meeting of coconut research workers in Soil Science, Agronomy and Breeding was convened on 8th November, 1984. Forty seven scientists from CPCRI, Kasragod, KAU, TNAU, PCRS, Mahuva, ARS, Arsikere participated.

Dr GSLHV Prasada Rao attended 6th Symposium on Plantation Crop held at RRII Kottayam during December 16-20, 1984 and also attended International Symposium on concept and technique of applied climatology held at the Andhra University, Waltair during March 18-21, 1985.

Sri M. P. Abdurazak attended the annual convention of the Computer Society of India during 11-16, March 1985 at New Delhi.

The total number of research project as on 31-3-1985 was 49.

Sri P. J. Joseph, Hon. Minister for revenue, Government of Kerala, Sri Therambil Ramakrishnan, MLA and Sri A. V. Hamza, Executive Committee Members and Sri Felix Von Surv, Fodder Expert KLD & MM Board, Trivandrum visited the station.

Concluded Projects

Crop Management

1. Fertilising direct seeded semi dry rice (Viripppu) unirrigated double crop wet lands of Northern Region (Pilicode)

This experiment was laid out in the research station, as well as in the cultivator's fields to find out an effective method of fertilizer application for Viruppu sowing in the northern part of Kerala.

The mean yield data for 3 years indicated that the entire dose of P & K can be applied as basal dose or half as basal and the 2nd half 15-20 days after germination without any appreciable change in grain yield.

Ongoing Projects

2. Fertilisation of existing germplasms and description of varieties (coconut)

The germplasm collection in Pilicode consists of 28 exotic and 34 indigenous cultivars. The exotic varieties Philippines Ordinary, Cochin China, New Guinea and Ceylon were found as the highest yielders.

Among the indigenous varieties, Laccadive Small and Spicata were found as top yielders.

In oil content, the indigenous cultivars were superior to exotic ones.

3. Evaluation of Tall x Different Dwarf and their reciprocals

This study was confined to the performance of 15 hybrids (T x D) and West Coast Tall for a period of eleven years from 1973.

In spite of the unsteady bearing of hybrids, their yield was significantly superior to West Coast Tall. Among hybrids, T x CDG and T x MDY recorded the maximum yield. The higher yield of hybrids was due to large number of functional leaves, female flowers and good setting percentage.

Trial of promising seed materials

Even though no significant difference was observed among the varieties, T x GB recorded the maximum number of functional leaves in the year 1984. Earlier flowering was observed in CDO x T, T x CDO and T x GB.

Study of second generation selves and sibmated progenies in coconut

The mean yield data for 6 years from the steady bearing stage (15th to 21st year) showed that sibmated progenies are significantly superior to the selfed ones. This can be attributed to the depression effect of selfing. The sibmated progenies of the grand parent 1 174 (2) were also significantly superior to the progenies.

Study of off types of different dwarf varieties

The palms have not so far reached the steady bearing stage. However the yield data recorded so far indicate that off type seedlings of such as Chowghat and Chowghat Dwarf Green are superior to the rest of the off types.

Evaluation of WCT x Different Dwarfs

The results showed that hybrid Tall x Niyongadung and Tall x CDG are superior to the other hybrids including Chowghat Dwarf Yellow x WCT, natural cross dwarf and also WCT.

Investigations on button shedding of coconut

Button shedding was high (52.02) in early season. This was due to the high intensity and amount of rainfall causing lack of pollen and pollinating agents. The physiological drought caused by water-logging may also contribute to this.

Common salt as a substitute for potash in the nutrition of adult coconut palms

The data so far obtained showed that the maximum increase in yield was obtained where NaCl and KCl were applied in terms of 750 g NaCl and 250 g K_2O/palm/year.

Response of D x T hybrids to common salt application

The observations recorded so far indicated that applying 250 g Na_2O and 750 g K_2O/palm/year is the best combination to produce the maximum vegetative growth and precocity (early flowering habit) in D T hybrid palms under Pilicode rainfed condition.

Irrigation cum fertiliser trial

Irrigation at IW/CPE 1.00 and fertiliser at the rate of 0.5 : 1.0 : 2.0 kg NPK/palm produced maximum girth of 73.50 cms and 77.02 cm respectively.

Investigations on the growth and yield of coconut cv. WCT as affected by methods of irrigation and fertilisation

Visual observation on growth indicate that drip irrigation @ 50% of the daily open pan evaporation is as good as surface irrigation at IW/CPE 0.5 and 0.75.

NPK fertiliser experiment with ordinary cultivar of coconut on Major soil types in different agro climatic regions—"West Coast Tall in lateritic soils"

No treatment was significantly superior. However, application of 500 g N + 500 g P + 1250 g K, per tree continued to produce highest number of leaves during the period 1977 to 1984. Six palms receiving the above treatment combined with Ca and Mg flowered in the 8th year of growth.

inter and mixed cropping trials—Effect of raising cocoa as an intercrop in adult coconut plantations

The data collected for the period from 1965 to 1983 showed that there was no yield difference or crop competition with respect to coconut. The per hectare yield of cocoa was significantly superior in double hedge system of planting as compared to single hedge planting.

Investigation on the species composition, nature of damage, population fluctuation and alternate hosts of Cockchafer beetle

The different species of Cockchafer beetles identified hither to are *Anomala ruficapilla*, *Sopiops* sp., *Schizonycha* sp. and *Apogenia* sp. The population fluctuations of the different species of root grubs from April 1984 to March 1985 were observed. The population of the root grubs was found to be significant from May to September. With the onset of dry months, the population started declining. It was seen that the damage by later instar larvae during the summer months was more significant.

Almost all the intercrops in coconut and many other plants were attacked by Cockchafer beetles. The plants attacked include colocasia, tapioca, pepper, arecanut, roses, bhindi and groundnut.

Biological control of Oryctes rhinoceros

The survey and collection conducted have not helped to obtain any bioagent having good suppressive potential against the rhinoceros beetle. A good culture of *Platymeris laevicollis*, an exotic predator bug of the rhinoceros beetle has been built up. At present, about 11,000 insects are being reared to adulthood. Release of about 400 adults was done in Neleshwar farm. A total number of about 3000 eggs were also released. They have not yet established in the field.

Investigations on stem bleeding disease of coconut

Four species of fungi were identified and isolated, viz. *Phytophthora* sp., *Diplodia* sp., *Rhizopus*, *Aspergillus* and *Trichoderma* sp. Even though no fungicide was found effective in controlling the disease, the application of neem cake showed less incidence of disease.

Rice

Varietal trial on Rice—I and II Crop Seasons (1) Research Station (2) Cultivators' fields

During the I crop season seven high yielding varieties were tried in the research station. Cul 1993 was found to be significantly superior in yield with respect to grain (2153 kg/ha) and straw (1733 kg/ha).

The same trial conducted in the cultivators' fields showed that Aswathy gave the highest grain yield (2330 kg/ha) and Cul 1065 gave the maximum straw yield (3665 kg/ha), even though the yield differences were not statistically significant.

The trial with seven local varieties in the Pilicode station showed that there is no significant difference in grain yield. The variety Thowan (3306 kg ha) recorded the highest grain yield and Malakkaran gave significantly higher straw yield (3000 kg ha).

The repetition of the trial in the farmer's fields showed that Ambikkanman gave the maximum grain yield (3060 kg ha) and the straw yield was highest for Malakkaran (6580 kg/ha).

During the second crop season the same trials were conducted in the research station as well as in the cultivators' fields.

The results of the trial with the high yielding varieties in the research station showed that the IR 20 was significantly superior in grain and straw yield.

The results of trial with the local varieties in the station showed, that Vellaryan could give the maximum grain yield (2920 kg ha) and straw yield (4500 kg/ha).

The experiment in the cultivators' field could show that IR 20 (3833 kg ha) among the high yielding varieties and Ambikazhi (Vellar) (3555 kg ha) among local varieties gave the maximum grain yield. The IR 20 among high yielding varieties and PTB 12 among local varieties gave the maximum straw yield.

Evaluation of rice germplasm collection for the northern region of Kerala

Detailed evaluation of a large collection of high yielding varieties and cultures of paddy were done and 23 varieties were promoted for preliminary yield trial during the 1st crop season of 1985-86.

Breeding high yielding varieties of rice for the saline areas of Kerala

During second crop season of 1984-85, fourteen mutant lines of Odacheera in the M9 generation were raised in the saline plot near research station for evaluating salinity tolerance resistance. Based on this, four lines have been selected and promoted for PVT during 1985-86.

Studies on the effect of Blue green algae as a bio-fertiliser for rice crop

The Cyano bacterial population inoculated in the rice fields of Pilicode station could not give satisfactory growth by multiplication. So, survey was initiated in the paddy fields of Kasaragod and Cannanore districts to study the distribution of native sp. Cyanobacteria. A good population of native strain was noted even at pH 4.5 which shows the possibility of isolating efficient strains from local population.

Studies on the utilisation of Azolla as a bio-fertiliser for Paddy in northern parts of Kerala

In the 25 types of Azolla collected from different fields, only 5 numbers were selected for further study. It was observed that lime

application could enhance the multiplication and growth in general Azolla Pinnata (PIL-1) was found to be a promising type since it showed good sporulation under laboratory and field conditions. Further studies on the germination, keeping quality and viability of spores is in progress.

Screening Rice varieties for disease resistance

In a screening study with seventy four varieties in the 1st crop season and eighty in the 2nd crop season, it was found that 23 varieties in the 1st crop and 18 in the 2nd crop season were infected by blast spot. All the varieties were susceptible to sheath blight. Incidence of leaf blast was mild in both seasons. In the 2nd crop season, all the varieties were found susceptible to brown spot but in the 1st crop season 12 varieties were found resistant.

Survey of rice crop to identify the major diseases affecting rice in northern region of Kerala

Based on the survey, two chemical control trials were laid out to evaluate a few promising systemic fungicides against sheath blight and blast disease of rice. In the experiment on chemical control of sheath blight, though the yield was not significant, all the treatments were found to be superior over the control.

Screening rice varieties against major pests

Eighty varieties were tried for the incidence of leaf roller, stem borer, gall fly and ear head bug during first crop season. It was found that incidence of gall fly was negligible in varieties, Sakthi, Bhadra, Cul. 23332/2, Cul 1180, Krishna and Kumar. Gall fly attack was high in Jaya, IR 20, Au 1, Madhu, MN 5442, Triveni, Kaveri, Suma, PR 106 and Pennai.

In Jaya, Sabari, Cul 7944, Cul 1180, Cul. 3, Bharathi, Kaveri, Vani, PR 106, Pankaj, MO 5, Satya, Panjathi and Pennai, the leaf roller attack was high.

Breeding rice varieties for BPH resistance Multilocational trials with short duration cultures

In this experiment four cultures were tried with a local check as control. The varieties were Cul 93, 129, 170, Jyothi and Thanmoram.

It was observed that all varieties and local check were susceptible to gall midge. But, Cul 93, 129 and Thanmoram were resistant to stem borer.

All the cultures were found susceptible to leaf roller attack. Yield was high for culture 170.

Multilocational trial with Medium duration (Jaya) cultures

Among the varieties, Cul 126, 168, 169, Jaya and Thanmoram tried, culture 168 and 169 were found tolerant to gallmidge, but Jaya was

the most susceptible variety. All the cultures except Jaya showed lesser intensity of stem borer attack.

Leaf roller attack was maximum in Jaya. Other cultures tried, were also susceptible. Maximum yield was recorded by Culture 168 (ARC 6650 x Jaya).

Screening pepper varieties for shade tolerance in Coconut garden

The observations taken during the period revealed that variety Panniyur 1 was superior to the rest of the varieties in growth rate (height). The vines planted on standards other than coconut were faster in establishment and growth. Among the two standards, viz. Moringa and Subabul, the former was better. The vines grown on this standard exhibited faster growth rate irrespective of the varieties tested. With respect to the production of Plagiotropic (fruiting) branches also significant difference was seen between the two standards tried. Moringa being better. The variety Karimkodi was found to put forth the maximum number of Plagiotropes. Most of the varieties have started spike production. The percentages of vines flowered in each variety showed that maximum was in Panniyur 1.

Influence of raising Cocoa as an intercrop in the coconut garden on the chemical and microbiological characteristics of laterite soil

The study revealed that growing of cocoa as an intercrop in cocoout garden favoured the population build up of beneficial micro-organisms (Diazotrophs, Beijerinkia and Azotobacter) in the root environments of coconut and also in the interspaces of coconut. Total bacteria and fungi were also found to be favoured by intercropping.

Nutritional studies on sweet potato grown as a floor crop in coconut garden

The results obtained showed that the application of 25 kg N and 25 kg K ha has given the highest mean yield of 23.81 tonnes ha marketable tuber.

Cropping pattern & Farming systems—Studies on the association of beneficial Micro organisms in the root environment of pepper and its standards

The rhizosphere of pepper was found to harbour the diazotrophs of which Azospirillum out number Azotobacter and Beijerinckia. It was found that Azospirillum produces phytohormones such as IAA and GA like substances which enhance the growth and nitrogen free fixing capacity of soil.

Survey and identification of soil and airborne diseases of different crops in coconut based farming systems

In the coconut banana system a banana leaf fall was observed in Kuttoor and surrounding areas. Preliminary studies revealed that this

could be due to deficiency of potash and an extra application of Muriate of potash @ 250 g/plant could give healthy plants and bigger bunches.

In Kundileri, a disease named "Pottan" caused due to a combination of fungus and nematodes was observed.

A combined application of Furadan 3 G, (25 g/plant) and 1% Bordeaux Mixture (3 litre/plant) in three split doses could effectively control the disease, giving heavy bunches.

Pulses and Oilseeds

Screening of varieties of pulses and groundnut for growing as floor crop in coconut gardens

Main objective was to find out suitable varieties of pulses and groundnut in the interspaces of coconut gardens.

The groundnut varieties, 1277 and DH 3.30 produced maximum yield (2277 kg/ha) even though the varietal difference was not significant.

Among the four varieties of blackgram tried, T9 produced significantly higher yield than, CO 2, M3 and KMU3. In rice fallows, KMU3 produced significantly higher yield.

In the trial with ten varieties of Cowpea, HG 22 gave significantly superior yield (249kg/ha). Higher yield of haulm (1307 kg/ha) was obtained in the case of HG 28.

Studies on field response of legume crops to Rhizobium inoculants

In this experiment, the legume seeds were treated with peat based cultures of Rhizobium from IARI and Coimbatore. The treatments did not show any significant increase in nodulation over control. The strains of native Rhizobium in the soil were more efficient. So that the introduced strains could not out do the local strains. Inoculation slightly increased the nodule number and dry weight in groundnut. But in cowpea, blackgram, greengram, there was no increase in nodulation or dry weight.

Potential evapotranspiration by different methods for the State of Kerala

An empirical formula was obtained using the weather data at Pilicode for computing potential evapotranspiration

$$E = 3.3 - 0.35269 + 0.3019175 \times MRH$$

Where E = Estimated open pan evaporation mm/day

MRH = Mean Monthly morning relative humidity in percentage

Water availability periods for crop planning under rainfed conditions of Kerala

The total number of water availability periods are high (280 days) at Alleppey and less (210 days) at Kasaragod. The study also indicated that the number of water availability periods increased towards the southern region of Kerala.

Climate and coconut production

The absence of pre- and post-monsoon rains and the high intensity of sunshine during the rainy season adversely affected the 2nd year yield and the mean annual number of bright sunshine hours before the initiation of spikes favourably influenced the monthly nut yield

Drought and coconut palm

The effect of drought on coconut palm begins when the aridity index exceeds 65 Based on this a new arbitrary classification was derived to assess the intensity of drought on coconut palm under rainfed conditions

Vegetables & Tuber crops

Scheduling irrigation for vegetable crops

In this experiment, cowpea (yard long variety) and cucumber were given different methods of irrigation and mulching In both cases, pitcher irrigation gave the maximum yield followed by cultivator's method of irrigation In both cases mulching proved ineffective

Highlights

Coconut

T x D hybrids have been found to be far superior to their reciprocals and the WCT

Common salt is beneficial for coconut

Application of neem cake at the rate of 5 kg per palm checks the spread of stem bleeding disease

Cropping systems

Intercropping of coconut gardens with cocoa has been established as a profitable proposition The profit per ha worked out to Rs 7807 00, Rs 8999.00 with single hedge cocoa and double hedge cocoa, respectively The profit from the monocrop was Rs 6512 00

Pepper

Inoculation of pepper cuttings with Azospirillum, a nitrogen fixing bacterium enhances root formation, root development and biomass production

1.6 PEPPER RESEARCH STATION, PANNIYUR

The station was started in 1952-53 in Panniyur village of Taliparamba Taluk in Cannanore District With the acquisition of additional area in 1981, the total extent of the farm is 26.13 hectares Terracing, levelling and planting in the new area are being continued.

The main crop is pepper, which at present occupies an area of about 13 hectares. Pepper planting in the new area is taken up as a phased programme and all suitable areas will be brought under pepper within the next three years subject to availability of resources.

The other subsidiary crops are rubber, coconut, arecanut, mango nd other fruit plants. Annual crops such as banana, tapioca, vegetables tc. are also raised on small scale.

Sri V. Sukumara Pillai, Associate Professor continued to be in harge of the station.

There was no change in staff pattern during the year under report.

Staff members of this station attended the VI Regional Workshop of NARP held at RARS, Pilicode on 14th and 15th March 1985. One staff member of this station attended the refresher training in Audio Visual aids and mass communication media from 18 to 21 rd February 1985 held at the Communication Centre, Mannuthy. One staff member of this station attended the Workshop of NARP (High Range) held at RARS, Ambalavayal on 22nd and 23rd February 1985. One staff member of this station attended the Mini Package Workshop held at Vellanikkara on 23rd January 1985. Staff members of this station attended the Regional Workshop of NARP and KAEP held at RARS, Pilicode on 24th August 1985. Staff members of the station attended T & V workshops of Cannanore, Calicut and Wynad districts during the year under report. Besides the above Workshops Training programme; seminars and Kisan Melas, Workshops etc. organised by various extension agencies were also attended by the scientists of the station.

Number of research project as on 31-3-1985 was 18

Research highlights

Crop Improvement

In the evaluation of seedling progenies of black pepper, two cultures viz No 239 (Perumkodi O P.) and No.331 (Uthirankotta x Cheria Kanakadan)—both planted in 1975 — were seen to be promising. They have given an average green yield of 3.576 kg (from 4th year to 7th year) and 4.231 kg) from 4th year to 8th year) respectively. These cultures were included in the multilocation trial started in 1984.

A comparison of spike length of varieties during 1983-84 and 1984-85 indicated that it fluctuated appreciably due to variations in seasons. In case of the number of developed berries per spike, seasonal influence was less marked.

Genotype x season interaction and stability parameters in five varieties of black pepper were estimated based on the yield for five years form 1979-80 to 1983-84. The varieties were Panniyur-1, Kuthiravally, Arakkulammunda, Kalluvally and Balankotta. The interaction was found to be significant. Based on the various parameters of stability, Kuthiravally was found to be the most stable variety, followed by Panniyur-1.

Path analysis on pepper revealed that the character number of spikes contributed most to yield followed by number of developed spikes per vine other characters studied being spike length and berry number per spike other characters studied being spike length and berry weight

Correlation study on pepper for spike and berry characters showed that genotypic correlation between characters were in general higher than phenotypic correlations

It was shown by using discriminate function that Malabar and Tevanatte ecotypes of pepper can logically be grouped separately for all the characters studied Malabar ecotypes had greater expression for all the characters studied except for the ones it developed better Spike characters studied except for the ones it developed better Spike

Two computational formulae were worked out for the easy estimation of leaf area in pepper namely (1) leaf area = 0.672 and (2) a regression equation as Y 15.26 + 19.36X 49.51X where Y X and X were area length and length breadth ratio of leaf respectively Both the methods were fairly accurate

Crop Management

Studies on the influence of planting materials on the growth habit and yield of pepper vines revealed the planting middle one third portion of runner shoots had maximum growth rate early flowering habit and production of spike in pepper Mean yield per plant too was maximum in this treatment

Studies on hormonal application on root formation and development in pepper cutting, has revealed that dipping the lower cut end of the cuttings in 1000 ppm IBA solution for 45 seconds was highly advantageous However, for smaller nurseries Seradix B or B_2 can be used as the material is readily available and it can be easily and conveniently handled by lay man

Plant protection

In a study on the etiology of fungal pathogens (anthracnose) of pepper caused by the fungus *Colletotrichum gloeosporioides*, it was found that leaves on all sides of the plants were infected by the fungus but the rate of infection was maximum on the southern side of the plant

Shedding of spikes due to anthracnose was found to be almost as high as that due to all other reasons combined This shows that proper control of anthracnose will reduce the loss due to spike shedding by about 50 percent

Infection by the fungus can occur as the barrier from early stages of its development itself Early infection results in loss of weight of berries upto 77 percent as the berry development process is arrested in this case. Late infection retards berry development which ultimately results in loss of weight upto 56 per cent.

Four to eighteen percentage of berries were affected by the disease every year (depending upon the variety and climatic factors), the annual crop loss due to the disease works out to about six per cent. The total reduction in yield due to spike and berry infection together estimated is 8 to 12 percent annually.

Initial results of the studies on the ecology of quick wilt (Foot rot) disease indicate that a combination of temperature lower than 23°C and relative humidity greater than 95% induces the disease incidence.

Studies on the control of Nursery disease of pepper cuttings have revealed that among the various shade intensities provided for raising cuttings, no significant difference was noticed in the incidence of disease. However, significant difference was noticed in the percentage of germination of cuttings from among the different shade groups. From among the different fungicides tried at fortnightly spraying and fortnightly spraying and drenching, fortnightly spraying and drenching 1% Bordeaux Mixture followed by 0.1% Difolatan were found to be effective in reducing the incidence of the disease to the minimum.

Variety Kuthiravally was found to be the highest yielder followed by Panniyur-1 based on the pooled analysis of yield data from 1979-80 to 1983-84

Pollu disease - Field trial for the control of fungal pollu

Experiments to control the anthracnose was in progress since 1973-74. Earlier studies on this aspect revealed that one per cent Bordeaux mixture is the cheapest and most effective fungicide against the disease, provided the fungicidal application is done at the proper time. For fixing the proper time of application of the fungicide, an experiment was conducted from 1980-81 to 1983-84.

Results of the experiment showed that two sprayings, one just before flowering of the plants and another at the time of berry formation were optimum under normal conditions. Where severe disease is anticipated, one more spraying in between the above two is advisable.

Study on the Etiology and Ecology of fungal pollu in pepper

In this study, observations on leaf infection, spike infection and berry infection were recorded from 1980-81 to 1983-84.

It was observed that leaves on all sides of the plants were infected by the fungus, but the rate of infection was minimum on the southern side of the plant (20.44%).

Shedding of spikes due to anthracnose was found to be almost high as that due to all other reasons combined.

Infection by the fungus can occur on the berries from early stages of its development itself. Early infection results in loss of weight of berries upto 77 percent as the berry development process is arrested in this case. Late infection retards the berry development which ultimately results in loss of weight upto 56 per cent.

Four to eighteen percentage of the berries are affected by the disease every year (depending upon the variety and climatic factors). The annual crop loss due to the disease works out to about six per cent. The total reduction in yield due to spike & berry infection together is estimated as 8-12 per cent annual.

Ongoing projects

Observational Trial on different five standards for pepper

Seven new species were planted in 1982. The pepper will be planted in the coming year (1986).

Anatomical studies on Piper nigrum and related spacies

Stem of the variety Kuthiravally was studied. It is seen that the anatomy of stem of Kuthiravally does not differ from that of Panniyur-1 which has already been studied. The study will be done on other plant parts of the variety as well as other varieties.

Germplasm collection and screening of pepper varieties

Besides yield, characters like spike length developed berries per pike, underdeveloped berries per spike etc. were recorded during the year.

It was observed that the spike length was generally higher during this year compared to last year. This indeed shows the effect of seasonal differences.

Morphological studies on pepper varieties

Foliar traits of 40 varieties were described. Considerable variation was observed among varieties. The work has to be continued for other varieties. A leaf area constant was worked out for the easy estimation of leaf area in pepper.

Intervarietal hybridization in pepper

572 seedling progenies were planted in the field during June, 1984. Artificial hybridization involving 6 parental combinations were made. During the current year, a multi-locational trial of promising cultures was started.

The yield of seedling vines during this year was poor.

The data so far obtained in the various cultures showed that two cultures were promising. The average yield over a number of years of the cultures 239 & 331 were 3.240 kg and 4.112 kg respectively (single plant).

Irrigation experiment on pepper

An irrigation experiment on pepper was started and is in progress since 1981 to find out the effect of summer irrigation on the growth, flowering pattern, berry setting and yield of pepper (Variety Panniyur-1).

The yield performance of plants under different treatments showed considerable annual variation. This might be due to the adjustability of plants to the practice of summer irrigation. To find out the effect of each treatment in the long run the experiment has to be continued for some more years.

Studies on the influence of planting materials on the growth habit and yield of pepper vines

An experiment to investigate the influence of planting materials on the growth habit and yield of pepper vines was in progress since, 1977.

This year, yield data showed that basal one third portion of the runners gives higher yields followed by the middle one third portion of the runners. This is not in confirmity with previous year's observation. The experiment has to be continued for some more years to get conclusive results.

Plant Protection

Ecological studies on quickwilt disease of pepper

The weather parameters, such as rainfall, number of rainy days, maximum and minimum temperatures and relative humidity are being recorded daily along with the number of pepper vines affected by quickwilt disease in the plot selected for the purpose since May, 1976. Studies are to be continued for some more years.

Initial results of the studies on the ecology of quickwilt (foot rot) disease indicate that a combination of temperature more than 33 C and relative humidity less than 90 % is unfavourable for the incidence of quickwilt (foot rot) disease.

Evaluation of newer fungicides against quickwilt (foot rot)

In vitro studies using newer fungicides, some of them having systemic and semisystemic action have been in progress since 1981. *In vivo* studies using different fungicides as per the recommendation of VIth workshop of All India Coordinated Cashewnut and Spices Improvement Project, held at Calicut during November, 1983 have been started during 1984-85.

Studies on the control of Nursery disease of pepper (Piper nigrum) cuttings

An experiment to control the nursery disease of pepper cuttings was in progress since 1981.

Results of the studies on the control of nursery disease of pepper cuttings indicated no significant difference in the incidence of the disease in various intensities of shade provided for raising the cuttings From among the different fungicides tried at fortnightly spraying and fortnightly spraying and drenching 1% Bordeaux Mixture followed by 0 1% Dilolatan was found to be effective in reducing the incidence of the disease to the minimum

Screening of germplasm collection and promising hybrid lines grown under shade for disease tolerance

An experiment was laid out for evolution of shade tolerant high yielding pepper varieties during 1982 As a sub project of this project the incidence and intensities of quick wilt (foot rot) fungal pollu and spike shedding are being recorded to find out disease tolerant type if any

Screening germplasm collection and promising hybrid lines grown under shade for pest resistance

An experiment was laid out for evolution of shade tolerant high yielding pepper varieties during 1932 As a sub project of this project the incidence of pests like pollu, top shoot borer, marginal gall forming thrips and scale insects are being recorded to find out pest tolerant types if any

Plant Protection

Studies on the control of pink disease of mango

An observational trial for the control of pink disease of mango with 26 treatments was started during June, 1981. Based on the result of the observational trial, a full fledged replicated trial with five treatment was started during June, 1983, which is being continued

Minimum infection was noticed in treatment of removal of drie twigs and branches, scrapping of the pink encrustation of live branches cutting of the infected part, if it is a small twig and application of woun dresser (3%, calixin in latex) at the cut surface, scrapped area and to th fork region during the last week of June and spraying of calixin 80% E @ 1 ml per litre of water in the last week of June and first week o December However, this observation is not in agreement with th last year's observation

Other matters

Kisan mela of Lab to Land programme and Krishidarsan programm were conducted at the station on 12th March, 1985.

One staff member of this station attended the workshop for writin articles for News papers held at the Directorate of Extension, Mannuth on 6th and 7th March 1985.

Visitors

M s Therambil Ramakrishnan, MLA, A. V. Hamsa, and K. Sivasankara Pillai, Executive Committee members visited the station on 1-9-1984.

1.7 REGIONAL AGRICULTURAL RESEARCH STATION, AMBALAVAYAL

The Research Station was established in 1946 as part of Wynad Colonisation Scheme to carry out research on various aspects of improvement of agriculture in Wynad in general and the Colony area in particular, to make available quality seeds and planting materials for distribution to the cultivators and to render scientific advice on improved agricultural technology. In 1966, the station was upgraded as Central Horticultural Research Station to undertake intensive research on major horticultural crops especially fruits, spices, essential oils etc. In 1972 it was taken over by Kerala Agricultural University. The station was brought under National Agricultural Research Project in November, 1983 and was upgraded to the status of a Regional Agricultural Research Station for High Range Region with lead function for research on citrus, mango and other fruits and paddy based farming systems and verification function for pepper, essential oils and medicinal plants. The Cardamom Research Station, Pampadumpara is a sub-station with lead function for research on cardamom and verification function for pepper and hill rice.

The Krishi Vignan Kendra, started as a small scheme with the objective of imparting training on Scientific technology in Agriculture and Animal Husbandry to the farmers of Wynad especially to the tribal communities was strengthened with the sanctioning of a full-fledged Krishi Vignan Kendra in 1983 with full financial assistance from ICAR. The strength of the poultry unit attached to the Kendra was enhanced from 50 birds to 200 birds during the year.

The station is situated in Sultan's Battery Taluk of Wynad district at an elevation of 914 m above MSL and has an area of 87.3 ha. The geographic location is at 11° 37' N latitude and 76° 12' E longitude. The soil is loam rich in humus. The area covered under different crops are

Fruits	16.50 ha
Coffee	2.50 ..
Pepper	7.00 ..
Cinnamon	1.50 ..
Clove and nutmeg	2.00 ..
Eucalyptus citriodora	12.50 ..
Coconut	4.60 ..
Rice	7.20 ..
Cashew	1.75 ..
Other seasonal crops	4.80 ..
Nursery	2.00 ..
Buildings, roads and uncultivated area	8.15 ..

The gross cultivated area is 96.50 ha. which is due to mixed planting of coffee and pepper. An area of 3.75 ha has been planted with coconut during the year under two experiments in the Eucalyptus plantation which has also increased the gross area.

Prof. K. Kannan, Associate Director continued to be in charge of the Station. Sri. C. S. Jayachandran Nair, Assistant Professor (Horticulture) continued to be on study leave for undergoing Ph.D. course.

Two NARP Zonal Workshops for High Range Region were conducted at the Station. The first was on 19th and 20th June 1984 in which 31 Scientists and Extension workers of Kerala Agricultural University, CPCRI, Rubber Board, Cardamom Board, Coffee Board, Agricultural Department etc. participated. The second one was conducted on 22nd and 23rd February 1985 in which 45 Research and Extension workers participated.

An Agricultural Seminar was conducted on 26-3-1985 in connection with the Kisan Mela organised under Lab to Land Programme.

Krishi Vignan Kendra conducted 97 training classes to the tribals of various tribal colonies. In all 1435 persons participated.

Monthly T & V workshops were conducted regularly.

Sri. V. S. Devadas, Junior Assistant Professor attended the Summer Institute on "Water Management Practices for Humid Tropics" held at CWRDM, Calicut from 2-5-84 to 22-5-84 and Sri. K. C. Aipe, Assistant Professor attended the Summer Institute on "Approaches to Research and Development of Dry Lands on Water shed basis" at All India Co-ordinated Research Project on Dry land Agriculture, Hyderabad from 2-5-84 to 26-5-84. Sri. T. P. Manomohandas, Junior Assistant Professor attended PLACROSYM VI held at Kottayam in December 1984 and presented a paper *Elettaria cardamomum* a new host for *Phytophthora palmivora* Butler.

Sri. V. S. Devadas, Junior Assistant Professor participated in the workshop on Agricultural Journalism (Editing and Processing) sponsored by the Directorate of Extension, Ministry of Agriculture at the Communication Centre, Mannuthy from 10-12-84 to 15-12-84. He also attended a seminar arranged by Jacees at Meenangadi on vegetable cultivation and took a class on Nutrition Garden to Wardens and Hostel Attendent trainees of KIRTADS.

Number of Research projects as on 31-3-1985 was 38.

RESEARCH HIGHLIGHTS

Crop Improvement

Performance evaluation of rice cultures and varieties for the first, second and third crop seasons

From a study with 12 cultures and varieties during the second crop season cul. 796 recorded the highest grain yield of 6442 kg/ha.

However it was on par with cul. 1-54 (6352 kg), cul. 745 (6001 kg), Mo 4 (5978 kg), Edavaka (5933 kg), IR-20 (5752 kg) and MDU-2 (5538 kg). A local selection Edavaka gave maximum straw yield of 6386 kg/ha while the highest yielding cul. 796 recorded only 3770 kg.

Crop Management

Response of rice to different levels and split application of lime in the acid soils of Wynad

Lime application even upto 1000 kg/ha both in single and two split doses did not show any significant difference in yield over no lime plots during the first crop as well as the second crop season. While no lime plots recorded 3266 kg and 6377 kg/ha in the first and second crop season, 1000 kg lime applied plots recorded 3228 kg and 6250 kg respectively.

Evaluation of herbicides for weed control in the rice fields of Wynad

Different weedicides were tried for weed control in the rice fields of Wynad. Total weed weight recorded at 20th, 40th, 60th DAP and at harvest showed that the least weed growth was in plots applied with Basalin + 2, 4-DEE at the rate of 1.5 kg ai/ha at 12 DAP followed by 2, 4-D E E at the rate of 630 g ai ha + Benthiocarb 1 kg/ha at 16 DAP. However all treatments including hand weeding and weed free check were on par and superior to unweeded control in respect of weed growth. Grain yield ranged from 4348 kg/ha to 4993 kg/ha in various plots while it was only 3465 kg/ha in unweeded control. With regard to economics while the cost of weedicides including application charges ranged from Rs 125 to Rs 230 per ha, hand weeding cost was Rs. 600/- per ha. Thus there is definite advantage in using weedicides for weed control in paddy fields. The trial will be repeated.

Standardisation of time of application of fertilisers for rice in the High Ranges

The study to fix up optimum time of fertiliser application under Wynad condition was taken up during the second crop season. The trial was conducted on two varieties ie, short duration Jyothi and medium duration Jaya. Total fertilisers applied were NPK 90:45:45 for medium duration and 70:35:35 for short duration. Four methods of application along with a no fertiliser control were the treatments.

The control plots in both the varieties recorded very poor yield. There was no significant difference between the other treatments in both varieties. However application of full P as basal, ½ N + ½ K at tillering and ½ N + ½ K at panicle initiation gave highest grain yield of 4778 kg/ha and straw yield of 3233 kg in Jyothi and application of ½ N + full P + ½ K as basal, ¼ N at tillering and ¼ N + ½ K at panicle initiation recorded the highest grain yield of 5200 kg/ha and 5035 kg straw in IR-20. The trial will be continued.

Trial on fertiliser requirement of pepper Var Panniyur-1 under the agro climatic conditions of Wynad

Maximum dry berry yield was obtained from plants applied with 25 g N + 40 g P + 225 K g per plant/year However this is at variance with previous year's result when the maximum yield was obtained from plants applied with 75 g N + 40 g P + 75 g K Pepper yield in general was very poor this year due to continuous drought experienced immediately preceding the flowering season.

Study of epidemiology and control of bacterial wilt of ginger

Bacterial wilt caused by *Pseudomonas solanacearum* (Smith) is a serious hindrance to ginger in Wynad causing heavy crop loss From a study involving 23 treatments for control of the disease, the least disease incidence was noticed in rhizome treatment with streptocycline 1000 ppm + foliar spray with streptocycline 1000 ppm + basal application of neem cake to supply N requirement Maximum yield was also obtained from the same treatment The trial will be repeated to get conclusive result

Studies on the control of soft rot of ginger incited by Pythium sp with newer fungicide including systemic fungicides

A trial involving 17 treatments was laid out for the control of soft rot disease of ginger No significant difference in disease incidence was noticed between treatments However minimum incidence was noticed in rhizome treatment with 0 25% organomercury + soil drenching with 0 1% organomercury. Maximum rhizome yield was obtained from plots treated with Captaf 5 G + soil drenching with calixin The trial will be repeated.

Varietal cum rootstock trial on Mandarin orange

The trial involving all combinations of 4 root-stocks and 5 scions showed that Coorg mandarin and Satsuma on Rough lemon rootstock are significantly superior in respect to all biometric parameters In general Rough lemon rootstock imparted more vigorous growth to the scions In respect of yield Kinnow on Troyer citrange gave maximum fruit weight (12 4 kg) followed by Satsuma on Rough lemon (11 7 kg) The best quality fruits were those of Coorg mandarin on Cleopatra and Nagpur mandarin on Trifoliate orange

Rootstock trial in Coorg mandarin

Coorg mandarin budded on six rootstocks ie. Rough lemon, Rangpur lime, Trifoliate orange, Cleopatra mandarin, Troyer citrange and Carrizo citrange are evaluated in this trial. No significant difference was noticed in respect of biometric and yield attributes between treatments However maximum fruit yield was obtained from Coorg mandarin on Rangpur lime and Carrizo Citrange.

Standardisation of Agro-techniques—Cultural trial in Mandarin orange

Slight reductton in chlorosis was noticed in plants mulched with green leaf and digging of basins. No significant difference in growth parameters was noticed between treatments.

Chemical control of powdery mildew of Citrus

Bavistin 1% spray once in a month during September, October, November and December significantly reduced the incidence of powdery mildew.

Screening mango varieties for growing in the High Ranges of Kerala

Twenty nine mango varieties available in the varietal collection of the station were studied for the bearing season, yield, quality etc. Pairi, Bennet Alphonso, Prior and Mundappa matured their fruits early ie., by the middle of April. Studies on other aspects are in progress.

Varietal-cum-planting material trial in cashew

Out of three types of planting materials tried ie., air layers, epicotyl grafts and seedlings, maximum per cent mortality (61.1) was noticed in air layers and the minimum in epicotyle grafts (8.3). In respect of growrh parameters the variety NDR-2-1 was the most vigorous. Epicotyl grafts performed better than other types of planting materials.

Evaluation of Cole Crops for High Ranges

Varietal evaluation of cabbage and cauliflower and the optimum time of planting to get maximum yield is studied in this trial. Fourteen varieties in each of cabbage and cauliflower at fortnightly intervals starting from the middle of September were planted. Planting in the second fortnight of September and first fortnight of October was found to give maximum yield both in cabbage and cauliflower.

Collection, evaluation and selection of different tuber crops including wild edible form; suitable for growing in the High Range Region

Out of 33 accessions of *Dioscorea alata*, 10 were selected after preliminary screening based on yield and quality attributes. They have been planted in comparative yield trials.

Five colocasia and five sweet potato types have been collected and planted for performance study

Other matters

The station participated in the Calicut Flower show, 1985 and got two first and two second prizes for rose collections and fruits and vegetables. An exhibition was also conducted at Government Sarvapana High School, Sultan's Battery in connection with District Science Fair.

A rose collection having about 400 varieties is maintained. Large scale production and distribution of rose buddings are done.

Visitors

Retired Justice P. Narayana Pillai visited the station on 27-11-84 Dasho U. Dorji, Agril. Officer and two farmers from Bhutan on 21-2-85.

Sri. B Eashwar Prasad, Horticultural Officer with 16 farmers from Andhra Pradesh on 17-11-84. Sri. M Ramachandran, Horticultural Officer with 12 farmers from Karnataka on 2-2-85. Sri. B. S Sharma with 5 farmers from Assam on 30-11-84. Dr. P. R G Mathur, Director KIRTADS on 11-10-84, twelve officers of Agricultural Department Cannanore district on 31-7-84, 8 M Sc (Bot.) students from Guruvayurappan College, Calicut on 8-12-84 and the Executive Committee Members, Kerala Agricultural University on 31-8-1984 also visited the station.

A large number of farmers also regularly visit the station.

18 CASHEW RESEARCH STATION ANAKKAYAM

This station was started in 1963 under a scheme included in the third five year Plan. The Research station is situated in Anakkayam Village in Eranad Taluk in Malappuram Dist. the location of the station being on the Western side of the Malappuram-Manjeri Road at a distance of about 9 km from Malappuram. The station occupies an area of 9.92 ha of which 8 ha are under cashew and 0.5 ha as coconut gardens. Rest of the area is occupied by buildings, roads, etc. The elevation of the location is 106.8 m above MSL. Soil is red laterite. The land is slopy and of uneven terrain. Soil is deep at some places and rocky in many places.

The objective of the station is to evolve materials, methods and means to increase the yield of cashew. This is achieved through breeding and selection to evolve promising varieties, recommending proper manurial schedules and cultural practices and measures to control pests and diseases. The evolution of suitable vegetative propagation methods and distribution of quality planting materials also forms part of the activities of the station.

A close planted progeny nursery consisting of 184 plants belonging to 16 superior cashew types is being maintained in the station. This is utilized for the production and distribution of air layers, budwoods etc for vegetative propagation of cashew.

Dr. M. N. C. Nair, Associate Professor continued to be in charge of the station till 11-6-84 and thereafter Sri K. I. James, Associate Professor was in charge of the station.

Developments during the year

During the year 1984-85, a total of 3698 kg (dry wt) cashew nuts were produced. Out of this, 2638 kg were sold as quality nuts and the rest as bulk nuts. The seeds were supplied to social forestry department, Calicut; Seed garden Complex, Nilambur; West Bengal Forest Development Corporation; Department of Agriculture, Agarthala; Plantation Corporation Ltd., etc and also to the public.

Rsearch

No. of research projects as on 31-3-85 was only one and four projects were concluded during the year.

Collection and maintenance of Types

The types and varieties of cashew are maintained to isolate superior ones for further multiplication or for breeding work.

Among other clonal types. K-19-1; NLR-2-1; K-10-2; K-25-2 and K-10-1 were the high yielders recording a yield of 25.4 kg; 19.0 kg, 17.5 kg; 16.1 and 15.1 kg respectively. In seedling types, BLA-139-1 recorded the highest yield of 29.6 kg followed by ABD-2-1 (14.4 kg).

As per the decision of Cashew Research Review Comittee, this germplasm collection has to be continued for one more year and all relevant data collected

Breeding improved varieties of cashew by hybridization

During this year also, H-4-7 and H-3-17 were the top yielders which recorded a yield of above 10 kg/tree (i.e. 18.6 kg and 17.5 kg respectively). All the other hybrid progenies were found to produce only an average yield below 10 kg.

Using certain promising hybrids available only at this station, breeding work will be conducted as decided by the Cashew Research Review Committee

Cultural Trial

To study the effect of various cultural treatments on growth and yield of cashew, the project was started in 1972.

Though the trial was started in 1972, the yield data upto 83-84 have shown that it has not yielded any useful results, so far. The Cashew Research Review Committee visited the station and suggested this trial be discontinued and the area utilised for planting clonal progenies of outstanding selections

Comparative Yield Trial

To study the perfofmance of the progenies of sixteen promising selections of this station, a comparative trial was laid out.

On analysing the yield data statistically, it was seen that there was no significant difference in yield due to different treatments. Based on the yield analysis for the last 8 years no significant result could be obtained

Research Highlights

During the year, the type BLA-139-1 was released as Anakkayam 1 which is the most important achievement of this station.

19 REGIONAL AGRICULTURAL RESEARCH STATION PATTAMBI

Rice Research Station, Pattambi was established as Paddy Breeding Station in 1927, to evolve high yielding rice varieties suited to the different agroclimatic conditions of the State. In 1930, the name was changed to Agricultural Research Station and in 1962 it became the Central Rice Research Station with regional centres at Mannuthy, Kayamkulam and Vyttila under the Government of Kerala. With the establishment of the Kerala Agricultural University, this station was brought under its control as one of the major stations for research on rice and for post-graduate work. With the implementation of NARP, the station was re-organised as Regional Agricultural Research Station, Central Zone. It undertakes intensive research on the production and protection technology in rice. The station has been allotted the lead function for research in Rice, Pulses and Oilseeds and Rice based farming systems. This station also functions as an advanced centre for studies on laterite soil management.

The station is located at 10°N latitude and 76°E longitude at an elevation of 25 m MSL. The total area is 63.64 ha. The soil is lateritic sandy loam and overlines unweathered soil. Ridges and slopes of low hills form the bulk of the modan lands. Palliyals are high level terrace lands with extremely porous soil. The soil in double cropped wet land is moderately fertile and deep.

Sri N. Rajappan Nair, Associate Director continued to be in charge of the station. A seed technology laboratory is attached to the station for the analysis of seed samples for the benefit of the Department of Agriculture. A dairy unit is also attached to the station.

The ICAR Co-ordinated Research Projects in operation are AICRIP, Double Cropping Sub-Centre, AICRP on chemistry of submerged soils, NARP rice based mixed farming system, AICRP on pulses and Krishi Vignan Kendra. Besides ECF unit of the All India Co-ordinated Agronomic Research Project also being implemented in the Palghat District with Regional Agricultural Research Station, Pattambi as head quarters.

Smt K. E. Savithri, Assistant Professor (Agronomy) has entered on study leave for two years for undergoing the Ph.D programme.

Details of seminars/workshops/symposia/summer institutes/training programmes conduted by the department/station/scheme.

The fifth and sixth regional workshops of NARP, Central Region were held at the station on 17th and 18th August, 1984 and 1st and 2nd February, 1985 respectively. The following trainings were conducted for the Agricultural Officers and Demonstrators of the Department of Agriculture and D. A. Sc. students.

Research

The total number of research projects as on 31-3-85 was 71.

Name of training	Duration in days	Number of batches
State Level training on Rice Production Technology (Kharif and Rabi 1984)	4	2
Training on pulses and oil seed production for Assistant Directors	3	1
Training on Rice production technology for Agricultural demonstrators	6	3
Training on pulses and oil seed production for Agricultural demonstrators	5	4
Inservice training for Agricultural demonstrators	1	2
Field training for VII D A.Sc students of IAT, Tavanur	18	2

Sri N Rajappan Nair, Associate Director, attended the International Conference on rainfed low land rice, jointly sponsored by ICAR and IARI at Bhubaneswar from 15th to 20th October, 1984.

Dr. K. P. Rajaram, Professor Soil Science attended the VIth meeting of the soil amendments and reclamation of problem soils organised by the Indian Standards Institution at New Delhi on 31-7-84, as the respresentative of the Kerala Agricultural University.

The Associate Professors of Agronomy and Botany and the Assistant Professors of Entomology and Pathology attended the Annual All India Rice Workshop of the AICRIP held at Orissa University of Agricultural Technology, Bhuvaneswar from 14-4-84 to 16-4-84.

Sri S. Mothilal Nehru, Assistant Professor (Extn.) attended the workshop on Developmental Communication at College of Agriculture, Vellayani for three days from 8-1-85 to 10-1-85.

RESEARCH

Rice (Concluded Projects)

Crop Management

Weed control trial for dry sown rice - Virippu season

The trial conducted to identify suitable herbicides for effective weed control in dry sown rice revealed that application of oxyfluorfen (Goal) 24 EC at 0.15 kg ai/ha followed by one hand weeding 25-30 days after sowing is the best treatment.

Economics of weed control in transplanted rice

To find out the economics of weed control in transplanted rice, an experiment was conducted during Kharif 1984-85 with different weedicides (2, 4-D, benthiocarb and butachlor). Results obtained showed,

that it is always profitable to maintain weed free condition as it ensures higher production, more employment opportunities and a safer cost benefit ratio. Among chemicals tried, 2, 4 D, Fenoxaprop ethyl + 2, 4 D, Pyrazosulfuron ethyl + 2, 4 D, Fenoxaprop ethyl and 2, 4 D gave maximum yield, profit and cost benefit ratio.

Fertilizer management trial for the rice variety Mahsoori under transplanted condition during Virippu and Mundakan seasons

An experiment was conducted for 3 years from 1982-83 to 1984-85 during Virippu and Mundakan seasons with six levels of fertilizers and three times of application of nitrogen. Pooled analysis of the three years data revealed that for Mahsoori as a transplanted crop during the first crop and second crop seasons, 50-25-25 kg N P K/ha is sufficient. With regard to time of application of nitrogen, the results showed that application of 50% N as basal, 25% at 40 days after transplanting and 25% N at 60 days after transplanting can be recommended for Mahsoori as a transplanted crop during Virippu season. While for the second crop season application of 25% N as basal, 25% at 20 days after transplanting and 50% at 40 days after transplanting is found to be the best.

District trial with semitall cultures of rice

The trial conducted to test the performance of three semitall rice cultures (Cul. 153-1, Cul. 200 and Cul. 204) developed at RRS Moncompu showed that these three rice cultures can give a grain yield more or equal to that of Jyothi and can significantly outyield Jaya and Mahsoori. Among the three cultures, Cul. 153-1 is found to be the best.

International Rice Weather Yield Nursery

An international trial was undertaken in collaboration with IRRI, Philippines, to evaluate the performance of 10 rice varieties and to evaluate the effect of weather parameters on the growth and yield of rice. Analysis of the data obrained showed that IR-9828-91-2-3 recorded the highest grain yield of 4030 kg/ha followed by IR-36 (3738 kg/ha) and MRC-1603-303 (3616 kg/ha). These three varieties had a duration of 114, 115 and 113 days with a per day grain production of 36.3, 33.7 and 32.5 kg/ha. The check variety Jaya recorded a grain yield of 3575 kg/ha in 123 days giving a per day production of 29.1 kg/ha.

Screening for leaf blast resistance

In an attempt to identify the reaction of rice varieties to leaf blast, 219 entries under National Screening Nursery I (NSN-I) and 335 entries under NSN-II were tested and 16 entries in each were found resistant to moderately resistant to leaf blast. These include two KAU cultures viz. KAU-153-1 and KAU-200.

Screening for sheath blight resistance

The project was to evaluate NSN entries for sheath blight reaction under transplanted field conditions. Out of 201 entries tested under NSN-I and 335 entries under NSN-II 23 and 14 entries respectively showed a resistance reaction.

Multiple disease resistance screening trial for sheath blight

The project was to identify entries showing multiple resistance to blast, sheath blight, bacterial leaf blight and rice tungro virus in hot spot locations. Out of 64 entries tested, 12 were resistant to moderately resistant to sheath blight. This includes KAU-126 also.

Chemical control of sheath blight

To test the efficacy of different fungicidal formulations for the control of sheath blight disease of rice, 6 chemicals were tested and it was found that spraying of Validacin @ 2 ml per litre twice at 40 and 50 DAP was the most effective treatment in checking the disease.

Evaluation and standardisation of new systemic chemicals in controlling rice leaf blast under upland conditions

The experiment was to evaluate and standardise Topsin-M, MBC, Bavistin and Hinosan in controlling rice blast and to fix the optimum dose of the chemical for disease control. Among the treatments, Hinosan at 500 ml per ha recorded the lowest leaf and neck blast incidence with highest grain yield which was significantly superior to all other treatments.

Economic spray schedule for the chemical control of sheath blight

The trial was to develop a suitable economic spray schedule for sheath blight control by a combination of systemic and topical fungicides. Spraying Vitavax followed by Hinosan was the best fungicidal combination in controlling both disease spread and disease severity.

Replicated trial for evaluating Agrozim 50 WP (carbendazim) in sheath blight disease control

The trial was to find out the relative efficacy of Agrozim 50 WP in comparison with Bavistin, MBC and Hinosan in sheath blight disease control. Agrozim 50 WP was found on par with other chemicals, in checking disease spread and severity.

Cataloguing rice varieties/cultures of Kerala against major pests of rice

The study was taken up to evaluate the rice varieties/cultures of Kerala against major insect pests of rice in the field. Out of 75 cultures/varieties evaluated, BG-12-1 is found to be a promising entry with regard to its reaction to gall midge, whorl maggot and leaf folder attack.

Ongoing Projects

Crop Improvement

Uniform Variety Trials

The object of the experiment was to evaluate the performance of early, mid and late duration rice cultures of various states of India in comparison with local checks. Two UVT 2 trials with 26 entries were conducted, one each in Kharif and Rabi seasons. During both the seasons the local check, cul. 23332-2 outyielded both the National check varieties Rasi and IR-36.

Preliminary Variety Trials

In order to evaluate the comparative performance of early, medium and late duration rice cultures, two PVT 2 trials with 64 entries, were conducted, one each in Kharif and Rabi seasons. During Kharif and rabi season, entry No. 627 (KAU 93) recorded the highest yield. The local check, Cul. 23332-2, was superior to the national check Rasi in both the seasons, but it was outyielded by IR 36 during both the seasons.

International Rice Yield Nursery

To test promising materials from the World's rice improvement programme under a wide range of environmental stress, two trials viz. IRYN (E) and IRYN (M) were conducted during the Kharif season. In the trial IRYN (E), the highest yield 4065 kg ha was recorded by an IRRI line, IR-13240-108-2-2-3.

The local check, Cul. 1-5-4 was found to be statistically on par with the international check variety IR-42 in grain yield in the IRYN (M) trial.

Breeding high yielding tall photosensitive rice varieties with good straw yield specifically suited for the Mundakan season of Kerala

During this year, fresh crosses have been effected at the IRRI Philippines, and are being passed through the RGA System. The advance generation materials are expected to be made available for selection in 1985-86.

Culture 25100 was released as a new variety RASMI (PTB-44) for cultivation in Mundakan season in place of varieties like PTB-4 and CO-25.

Two comparative yield trials were conducted, one with red riced cultures and the other with white riced cultures. Cul. 871 among the red riced cultures, and Cul. 841 among the white riced cultures appeared to be more promising. The trials are to be repeated during Mundakan 1985-86 for confirmation.

Breeding rice varieties for the ill-drained and temporarily flooded areas in Kerala

Two promising cultures BR–315-4 and BR 52-96-3 were got tested in farmer's fields in Palghat and Trichur districts through the Department of Agriculture during Virippu season. The cultures are to be tested in farmer's fields during 1985-86 Virippu season also to confirm their superiority.

Evolution of an awnless and higher yielding type of the rice variety 'Parambuvattan' for the Virippu cultivation in palliyal lands

To evolve an awnless and high yielding mutant of the variety 'Parambuvattan' the M_1 generation consisting of about 9000 single plants were studied during Virippu 1984-85. A total of 69 single plants with reduced awning were selected for further study and selection.

Breeding lodging resistant, fertiliser responsive, medium height rice varieties for dry sown Virippu season in uplands of Kerala

From the cross. Rasi x TI-421, 14, red kernelled and tall lines were put under a preliminary field trial cum purity testing during Virippu season in uplands. Two cultures, Cul. 1 and Cul. 2 were found to be uniform recording high grain yields than both the check varieties-PTB-28 and Suvarnamodan. These cultures will be tested under comparative yield trial during Virippu season in 1985-86 in upland

For improvement of Suvarnamodan and PTB-28, 226 F3 lines under four cross combinations were grown during the Virippu season. From these, a total of 51 promising single plants, with plant height more than 1m, red kernel and grain yield higher than the better check variety were selected for further evaluation during Virippu 1985-86.

Breeding cold tolerant varieties of rice for the high altitude region of Kerala

Two cultures, Cul 745 and Cul. 796 were tried in farmers fields in Wynad District in Punja season 1984 and also at the RARS Ambalavayal during Punja 1984 and Virippu 1984-85. Based on the general performance of cultures, they have been nominated for minikit trials in Wynad and Idukki districts during 1985-86

Evalution of Semi tall or dwarf of important tall indica varieties

M_1 crops of the three varieties PTB 1, PTB 23, PTB-26 were raised and a total of 278 single plants selected from the above three varieties

Breeding high yielding rice varieties resistant tolerant to sheath blight

The susceptible varieties Jyothi and Bhadra were crossed with Cultures 25331 and 1904 identified as resistant. A total of 13 crossed seeds in three cross combinations were sown and F_1 plants selected

Only six plants from the cross Bhadra × 25331 were found to be true hybrid plants and others turned out to be selfs. Seeds from the six hybrid plants were collected and stored for raising F_2 during 1985-86 Virippu season.

Improvement of rice varieties BR 51 and IR 36 for consumer acceptability

Forty eight plants from 13 cross combinations of BR 51 and IR 36 with red kernelled and bold seeded varieties, were grown and studied Out of these, 30 plants in 12 cross combinations were found to be true hybrid plants. Seeds from these plants were collected and stored for raising the F_2 population during 1986-86 virippu season

Breeding high yielding rice varieties with pigmentation at some plant parts

The important released high yielding dwarf varieties of the State were crossed with the dwarf purple variety IR 1552. A total of 26 crossed seeds from 8 cross combinations were sown and F_1 plants raised and studied. Out of these, 14 plants in six cross combinations were found to be true hybrids. Seeds collected from these plants were stored for raising F_2 population during 1985-86.

Crop management

Increasing fertilizer nitrogen efficiency in low land rice

The experiment conducted to test the efficiency of new urea materials revealed that sulphur coatad urea is the best form of urea for increased yield and increased fertilizer nitrogen efficiency in transplanted rice during both the first and second crop seasons. Basal application of sulphur coated urea at 58 kg N ha is found to be the economic dose for both the seasons.

Monitoring soil fertility and crop productivity under continuous rice culture at moderate levels of fertilizer application

The trial started in 1976. continued during this year also. The results obtained showed that during first crop season, yield increase mainly depended upon supply of nitrogen; but nitrogen has to be supplemented with phosphorus for higher grain yield during second crop season.

Weed control trial for transplanted rice

The experiment started during 1982-83 continued during the first and second crop seasons in this year. The results obtained revealed that under Pattambi conditions, for transplanted rice, weed control can be achieved by proper land preparation and water management practices.

Nitrogen management for low land rice pest and disease endemic areas (Sheath blight Trial) in Virippu season

To find out the effect of slow release nitrogen fertilizers on the build up of pests and diseases (sheath blight) in endemic areas, an experiment was started in 1983-84 and continued during this year also. The results showed that neem cake coated urea and coaltar urea had no significant influence on sheath blight incidence when the incidence was very low.

Fertilizer requirement of medium duration dry sown rice (IR-8) for the Kharif season

To find out the nutritional requirement of IR-8 as dry shown crop in the Virippu season, an experiment was conducted with three levels each of N, P_2O_5 and K_2O (50, 70 and 90 kg N/ha and 25, 35 and 45 kg of P_2O_5 and K_2O/ha). Analysis of the data revealed that there was significant difference in yield only due to different levels of N. Application of nitrogen at 90 kg/ha had given the highest yield (2608 kg/ha).

Fertilizer requirement of medium duration transplanted rice (Jaya) for the Kharif season

The trial conducted with 3 levels each of N, P_2O_5 and K_2O/ha (50, 70 and 90 kg N/ha and 25, 35 and 45 kg P_2O_5 and K_2O/ha have shown that different levels on N, P_2O_5 or K_2O have not significantly influenced grain yield. This may be due to the medium fertility status of the soil and this result will be applicable to soils where the NPK status is medium.

Fertilizer requirement of medium duration transplanted rice (Jaya) for the Rabi season.

The results of an experiment conducted in a soil where the N, P and K level is medium, with three levels each of N, P_2O_5 and K_2O showed that in a soil, where the NPK status is medium, N, P_2O_5 and K_2O @ 50:25:25 kg/ha is sufficient.

Fertilizer requirement of rice-rice-fallow cropping system

To assess the fertilizer requirement of a rice-rice-fallow cropping system and to study the extent to which these inputs could be safely reduced without causing appreciable reduction in yield, an experiment was conducted with different percentages of the present recommendation of N, P_2O_5 and K_2O 90:45:45 kg/ha. On analysing the system as a whole, it was found that application of 50% of the recommended fertilizer for the Virippu season and 100% of the fertilizer recommendation for the Mundakan season recorded the highest yield, which was on par with the treatment receiving full dose of the recommended dose for the Virippu and Mundakan season.

Fertilizer requirement of rice-rice-kolingi cropping system

To assess the correct fertilizer requirement of a rice-rice kolingi cropping system, an experiment was started in summer 1983 with different percentages of the present recommendation of N, P_2O_5 and K_2O. Comparison of the yield as a system for the Virippu and Mundakan season showed that the treatment receiving full doses of fertilizers in both the seasons recorded the highest yield of 6458 kg/ha closely followed by treatment receiving 50% of the recommended dose in the first crop season and 75% of the dose in the second crop season (6193 kg/ha)

Fertilizer requirement of short duration transplanted rice variety Triveni grown in the summer season

A fertilizer trial conducted with three levels each of N (50, 60 and 70 kg/ha), P_2O_5 and K_2O (25, 30 and 30 and 35 kg/ha) has shown that neither grain yield nor straw yield varied markedly.

Response of short duration rice varieties under different water management practices

Experiment conducted to formulate an economic irrigation schedule for the short duration rice grown in summer season showed that when water supply is limited, irrigations are to be scheduled to the rice crop at least 2 days after the disappearance of the ponded water. This will enable to maintain a reasonably high level of productivity.

Permanent manurial experiment (Tall indica and Dwarf indica series)

The experiment continued with tall indica and dwarf indica varieties showed that organic manure coupled with inorganic fertilizers will be better for rice production and cattle manure if available will be a better source than green leaves.

Identification of factors responsible for low level production of high yielding varieties of rice during the second crop season and formulation of technology for overcoming the yield decline

Time of planting from 22nd August to 12th November has not much influence on the grain yield during this Mundakan season. Among the four varieties tried viz; Jaya, IR-8, IR-20 and Bharathi IR-20 was better than others in general followed by Jaya. Uptake studies also revealed lack of influence of the time of planting on the nutrient uptake by the rice plant.

Plant Protection

Screening of rice varieties and cultures for resistance to blast, sheath blight and brown spot

The study was to assess the reaction of traditional Tall Pattambi strains, important high yielding varieties and promising cultures to blast

sheath blight and brown spot. Out of 49 entries tested, 10 entries showed resistance to moderate resistance to blast and 25 entries to sheath blight during both the seasons.

Causes for lack of response to P and K in rice

For preparing the fertility map of the station, soil samples have been collected from the different blocks of the farms and avilable P and K status have been determined. Soil samples having low, medium and high levels of P and K have been collected for conducting pot culture studies.

Micronutrient studies in the soils of Ankamaly and Chittoor areas.

Collected nine soil samples from Ankamaly and Chittoor areas where symptoms of zinc deficiency have been reported by the officers of the Department of Agriculture. All the samples have been tested for the available Zn, Fe and Cu and none of these samples were low in the availability of these nutrients.

Softening of hardened laterite material for agricultural purposes

To evaluate the effect of chemical agents on the softening of hardened laterites for agricultural purposes, bore holes of 10 cm diameter and 30cm depth were made on hardened laterites and chemicals such as sodium chloride, calcium sulphate, magnesium silicate, sodium citrate, potassium nitrate, calcium oxide and magnesium sulphate were applied at the rate of one kg per hole. Three years after the application of chemicals, the loose soil materials will be scraped out, measured and the physico chemical properties determined to assess the extent of weathering and softening of the hard laterites.

Bore holes of the same size were dug and seedlings of Subabul, Casuarina, Jack, Cashew, Eucalyptus, Glyricidia and Matti were planted and the rate of growth of plants will be recorded at periodical intervals for three years.

Observational trials on the effect of burning straw stubbles in rice fields on the physical properties of soil

The results of the trial showed that burning of stubbles/straw at the rate of 2.5 tonnes ha has not showed any significant difference in yield due to different treatments, but maximum water holding capacity is increased slightly due to burning stubbles.

Crop Management

Studies on input contribution in summer cowpea

Studies conducted to estimate the contribution of various inputs to the growth and yield of summer cowpea showed that the various inputs can be ranked in the descending order as irrigation, weeding, fertilizer application, plant protection and rhizobium inoculation.

Crop Improvement

Germplasm maintenance and evaluation of different pulse crops

Five hundred and seventeen cowpea, 56 green gram, 30 black gram and 28 horse gram collections were maintained during the year

Screening and selection of shade tolerant green gram varieties

Fifty eight varieties were tested during the year. All the varieties were found to be unsuitable for the situation as none of those produced seeds

Screening and selection of shade tolerant black gram varieties

Thirty two varieties were tested Out of these, only 12 varieties could be harvested as the other 20 varieties did not show seed setting These select varieties are to be grown for one more Kharif season in 1985-86 for further evaluation

Co-ordinated Varietal Trial on Moong

To estimate the yield potential of different green gram varieties and to select the best variety suited to the locality, two trials were conducted one in the Kharif season and the other in the Rabi season. During the Rabi season, out of 12 varieties tested, Pusa-105 recorded the highest grain yield of 1651kg/ha in the Rabi trial with 24 varieties, the variety Pusa 101 gave the highest grain yield of 950 kg/ha followed by Pusa-104 (923 kg/ha).

Cowpea Co-ordinated Varietal Trial

To estimate yield potential of different varieties of cowpea and to select the best suited variety for the locality, 24 varieties were tested during Kharif, the highest grain yield of 2068 kg/ha was recorded by the variety V-385. In the Rabi trial with eight varieties the highest grain yield of 1187 kg/ha was obtained from the variety V-16.

Blackgram Co-ordinated Varietal Trial

To estimate the yield potentials of different blackgram varieties and to select varieties suitable to the locality, two trials were conducted one in Kharif and the other in Rabi seasons. Out of the 23 varieties tested during kharif, the highest grain yield of 2212 kg/ha was recorded by PDU-1. Among the seven varieties tested during the Rabi season, the variety LBG-17 recorded the highest grain yield of 855 kg/ha.

Selection of long poded vegetable types of cowpea varieties for growing in summer rice fallows

Twelve varieties selected from 33 varieties tested last year, were put under a Preliminary Yield Trial during summer season. Except for the two varieties, Calicut 57 and Thiruvalla all varieties recorded green pod yields of more than 5000 kg/ha.

Screening and selection of cowpea varieties tolerant to shade

Eighteen varieties selected from 180 varieties screened during 1983-84 were yield tested. The highest green pod yield of 2078 kg/ha was reeorded by the variety Kunnamkulam local.

Breeding high yielding short duration cowpea varieties with better grain quality

The F_2 and F_3 population of the cross Krishnamany x Kanakamany were raised during the year. From these, 84 single plants having earliness red coloured seeds and also higher grain yields than the mean grain yield of Krishnamany (PTB-2) were selected. Another 9 single plants having light brown seeds and showing high grain yields of more than 10 g per plant were also selected for further study.

Evaluation of different cowpea varieties under two systems of harvest viz. green and dry pod

Six varieties were evaluated during this year. The highest mean grain yield of 1698 kg ha was recorded by the variety Pusa-2 and the highest green pod yield of 11310 kg ha was recorded by the variety New Era.

Breeding horsegram varieties suited to the locality through single plant selections

Two selections, Cul. 2 and Cul. 3 and the unselected Pattambi local were put under Comparative Yield Trial. Culture-3 recorded the highest yield.

Early arhar Co-ordinated Trial

To identify early arhar varieties suitable for Kerala, six trials were taken up during the year. The highest grain yields were recorded by DA 9, entry No 78322, variety ICPL-8306, ICPL 151 and variety H-77-216.

Evaluation of early arhar varieties for ratoon yields showed that ratooning of arhar is feasible under Kerala conditions.

Evolution of a high yielding sesamum variety for the uplands of Kerala by pureline selection in the Pattambi local variety

A total of 197 selected lines were studied and sixty eight single plants having earliness and high number of pods were selected for further evaluation.

Screening brinjal varieties for rainfed garden lands and summer rice fallows

Six distinct types selected from a population of the released variety SM-6, for fruit and plant characters were progeny tested during the year and five promising single plants were selected for further evaluation during Kharif 1985.

Collection and evaluation of sweet potato varieties

Twenty five varieties were collected and evaluated during the year. The highest tuber yield of 18,000 kg ha was recorded by the variety Kanhangad local and green vine fodder yield was maximum in the variety C 43 and 76 OP 5 (11333 kg ha)

Collection and evaluation of tapioca varieties suitable for rice fallows

Twelve varieties were collected and evaluated during the year. Mean tuber yield of 25,015 kg ha was recorded by the variety H-1687.

Selection of a suitable variety of chillies for garden lands and summer rice fallows of the central region

Twenty varieties were collected and evaluated and the maximum mean green fruit yield of 104 g plant was recorded by the type 44540.

Extent of adoption and constraints of adoption of recommended practices of major crops of Palghat district

Twelve Panchayats were randomly selected among the 12 blocks of Palghat district and a total of 185 sample farmers selected randomly from these twelve Panchayats were interviewed. The collected data have been coded for computer analysis and sent to College of Agriculture, Vellayani. After receipt of statistical tables, final report will be prepared.

Basic socio-economic survey of Central Zone

Based on the existing major farming situations of central zone, the sample size was fixed as 269, taking into consideration the Panchayats falling under the major farming situations. Interviewed 127 farmers and collected the pertinent data.

To assess the suitability of farm programmes of AIR for the farmers of Central Zone (Palghat, Trichur & Ernakulam districts)

Recorded 180 progammes of farm broadcast, out of which, 120 programmes were 'Vayalum Veedum' and 60 programmes were 'Gramarangam'. Data were collected from June, 1983 to May, 1984. In general, data reveal that straight talk is the most frequently used mode of broadcast. Similarly, the time alloted for agriculture is only 26 per cent. The final report will be prepared after completion of analysis.

Research Highlights

In the Uniform Variety Trails, the local check Cul. 23332-2 outyielded both the national check varieties Rasi and IR-36.

Culture 25100 was released as a new variety RASMI (PTB-44) for cultivation in Mundakan season in place of varieties like PTB-4 and CO-25.

The rice Culture 1727 of this station has outyielded the IRRI variety IR-36 by 0.5 t/ha in 43 locations tried in 18 countries during 1983-84. It still occupied the third position with regard to yield in the trials of 1984–85 in Kerala.

Cul. 1907 a white kernelled medium tall and short duration rice culture evolved from this station has been released as an improved variety, Swarnaprabha, suitable for cultivation under transplanted condition in all the three seasons of the crop and also for raising as direct sown crop during Kharif season.

Application of oxyfluorfen (Goal) 24 EC at 0.15 kg ai/ha followed by one hand weeding 25-30 days after sowing was found to be the best method for controlling weeds in the dry sown rice during Virippu season.

Studies conducted to find out the economics of weed control in transplanted rice showed that it is always profitable to maintain weed free condition. by hand weeding as it ensures higher production. more employment opportunities and a safer cost benefit ratio. Among chemicals tried, 2, 4-D, Knock weed 4 G gave maximum yield, profit and cost benefit ratio

For Mahsoori as a transplanted crop, a fertilizer dose of 50:25:25 kg NPK/ha is found to be sufficient in both the first and second crop seasons. The best time for application is found to be 50% N as basal, 25% at 40 days after transplanting and 25% N at 60 days after transplanting, for Mahsoori as a transplanted crop during Virippu season. While in the second crop season, 25% N as a basal, 25% at 20 days after transplanting and 50% N at 40 days after transplanting is the best.

In the International Rice Weather Yield Nursery IR-9828 91-2-3 recorded the highest grain yield of 4030 kg/ha and it has outyielded the local check Jaya

Spraying of Validacin 3 L @ 3 ml/litre of water twice at 40 and 30 DAP was found very effective against sheath blight disease of rice. Two KAU cultures viz. KAU 15-3-1 and KAU-200 were found moderately resistant to leaf blast and one culture viz. KAU-126 was moderately resistant to sheath blight disease.

1.10 AICRP ON AGROFORESTRY LIVESTOCK RESEARCH STATION, THIRUVAZHAMKUNNU

This scheme was started during December, 1983 with the following objectives :

Collection, screening and selection of promising germplasm of indigenous and exotic spp from analogue ecological regions.

Breeding and genetic improvement of trees, crops and fodder spp. to develop compatible associations in consonance with the cultural practices of local population.

Developing te lniques of cultural practices (in land preparation, progagation, spacing, thinning, pruning, pollarding etc.) and cropping and harvesting systems suitable for different agroforestry (i.e. Agri-Horticul Silvopastoral combinations) acceptable to local populace. This will help in ascertaining inter cropping without reduction in crop yields as far as possible, and evolving combinations of food and feed crops for nutrients production all the year round

Developing sequential system of intercropping so that the inter and under space on the land is utilised as long as possible by crops and later till rotation by shade bearing (sciophytic) fodder shrubs and grasses with appropriate management practices

Replacing shifting cultivation with stable cultivation by adopting appropriate management related to agroforestry based on its capability

Evaluating the economics of different agroforestry systems and establishing its correlation with the aims and objectives of resource management viz. conservation, development and utilisation

Sri. V. R. Krishnan Nair, continued to be in charge of the scheme and Sri. N. K. Sasidharan continued to be the Assistant Professor, operating the scheme at Livestock Research Station, Thiruvazhamkunnu

Details of Seminars

Southern zonal workshop of the AICRP on Agroforestry was held at Vellanikkara on July 10-12, 1984. The first annual workshop held at IGFRI Jhansi was attended by Sri. V. R. Krishnan Nair, Special Officer (Agroforestry).

Research

No. of research projects as on 31-3-85 was 3

Research Highlights

Ongoing Projects

Diagnostic survey and appraisal of existing farming systems and agro-forestry practices

The diagnostic survey was conducted in Palghat district. Three holding sizes viz. below 0.2 ha, 0.2-2.5ha and above 2 ha. were selected for the survey. Fourteen agricultural extension units representing the different agro-ecological situations of the district were chosen for the survey. Apart from this, one hill men settlement was chosen in Agali village of Attappadi block and the entire 51 families of this hamlet were surveyed. The summary of diagnostic survey indications is given below.

I House hold supply problems

Problems in basic needs.

a) *Food*

i) There is shortage of staple food i. e. rice. Majority of farmers purchase rice from open market.

ii) Low milk production.

iii) Shortage of fodder in dry period.

b) *Fuel*

i) Negligible production from own land.

ii) Valuable time particularly of women, is spent in going to the forests to gather firewood.

iii) Majority of farmers purchase firewood paying heavy price, so much so, a big strain is placed on the house hold budget resulting in a thorough upset of meagre finances, the farmer has.

c) *Shelter*

i) Construction of quality timber and poles are not available in most of the homesteads.

ii) All farmers have their own houses—The type and materials used vary according to their financial capabilities.

iii) Livestock also have shelter - either pucca or temporary.

iv) In many homesteads Mango (*Mangifera indica*) and Jack (*Artocarpus heterophyllus*) provide shade for people and live-stock.

II Production constraints

a) *Cropland*

Rice

i) Lack of assured irrigation facilities and adoption of unscientific water management practices.

ii) Distribution pattern of precipitation is quite erratic.

iii) Low productivity during second crop season.

iv) Lack of green manure.

v) Inadequate labour during sowing/planting and weeding operations.

vi) Increased incidence of pests and diseases due to favourable weather factors for multiplication of pests and diseases.

vii) Heavy incidence of weed.

viii) The labour charges as well as the cost of other inputs are very high while the price of the produce is low.

Tree crops

i) Unscientific spacing and mixed cropping systems followed by cultivators.

ii) Planting of poor genetic material

iii) Non manuring, under manuring and unbalanced manuring

iv) Lack of proper soil and moisture conservation measures

b) Garden land

i) Insufficient dry season feed production

ii) Inadequate production of fuel wood

III. Specific problem solving agro forestry potentials

Intercropping with leguminous tree spp. to improve soil fertility and structure, to increase water infiltration, conserve soil moisture and control erosion

Growing hedge row and live fences of fast growing and high yielding fuel wood spp.

Cut and carry fodder trees for increased stall feeding and usable manure production

Elimination of dry season feed gap by planting fodder trees as hedge row in crop land with concomitant erosion control effects and fuel wood possibilities.

Multilevel trees with under sown grass legume pasture.

Multiple cropping in coconut garden

Studies on management practices of agroforestry system

It is intended to take up seven field experiments under the above major project. Out of this, the following two experiments were taken up for implementation during the year under report

i) Compatability of different components in agro-horticultural system

ii) Spatial arrangements and harvesting schedules in silvopastoral system.

The seedlings required for the former experiment were procured and these seedlings will be planted with the onset of SW monsoon

Guinea grass Var. Mackeuni and *Leuceana leucocephala* cv *cunningham* were planted as per the treatments as regard to the second experiment. The growth of both the grass and tree components were satisfactory.

It is too early to comment on trends observed

Observational trial on effect of seed inoculation of *Leuceana leucocephala* with Rhizobium strain CB-81 on nodule development and growth of seedlings during the early stages

Seeds of *Leuceana leucocephala* (pern type) were inoculated with CB-81 strain of Rhizobium culture. The effect on nodule development and growth of seedlings were assessed. It was observed that the inoculation of Rhizobium strain CB-81 has favourable effects on nodule development and growth of seedlings.

Collection and evaluation of promising spp/ cultivars of fuel, fodder and small timber trees.

Five hundred seedlings each of *Ailanthus triphysa*, *Leuceana* ev K. 8 *Casuarina equisetifolia*, *Albizzia falcataria*, *Acacia auriculiformis*, *Artocarpus hirsuta*, *Artocarpus heterophyllus*, *Pterocarpus marsupium*, *Sesbanea grandiflora* and *Emblica officinalis* were raised for planting in the main field with the onset of the S W monsoon.

1.11 AGRICULTURAL RESEARCH STATION, MANNUTHY & INSTRUCTIONAL FARM, VELLANIKKARA

This station was originally established during 1957 as the Rice Research Station, Mannuthy in the then Central Farm as a separate research unit to study the various problems confronting rice cultivation in the middle lateritic region of Trichur and Ernakulam districts. With the formation of the Kerala Agricultural University, the station was taken over from the Department of Agriculture. In the year 1976 this station was converted as the Research Station & Instructional Farm of the College of Horticulture.

For efficient management and administrative convenience, the Research station and Instructional Farm, Mannuthy was renamed as Agricultural Research Station, Mannuthy and the Vellanikkara unit was retained as the Instructional Farm, Vellanikkara in the year 1983-84. The Agricultural Research Station, Mannuthy forms a sub-centre of the Central Region of the NARP and Special Zone for problem areas covering the kole lands of Trichur. Apart from the projects undertaken under NARP, experiments under All India Co-ordinated Rice Improvement Project, Adhoc scheme on Annual Oil seeds and University projects are also being implemented at this station. The station is located at Mannuthy by the side of National Highway at a distance of 6 km. east of Trichur at 10°22'' N latitude and 76°16''E longitude and at an altitude 1.5 m above MSL.

Sri T. E. Kuriakose, Professor and Project Co-ordinator (Rice) continued to be in charge of station.

Total area of the station is 38.34 ha with a cropped area of 34.75 ha. Crop coverage is coconut (Intercrops Banana, Cocoa, Coffee and Clove) 11.26 ha, Mango 12.13 ha, Rice 4.47 ha, Cashew and others 3.52 ha and nursery 2.75 ha.

Seeds and planting materials distributed to farmers and the amount realised

Paddy seeds 10.2 t and vegetable seeds 82.8 kg and ground nut 160 kg were distributed fetching a value of Rs 35,623.25.

Seedlings, grafts, layers etc

Coconut seedlings	7150 nos	Rs 42900/-
Fruit and spices	4012 nos	Rs 16569 -
Ornamental plants	3832	Rs 12775/-

Research

No of research projects as on 31-3-85 was 42

Research Highlights

i) Culture 10-1-1, Culture-8 and Culture 25332 are some of the most promising rice cultures found to be suitable under kole land condition.

ii) Culture 24-20, a very short duration culture which matures in 70-75 days gave comparable grain yield with the prevailing short duration variety, Annapoorna that matures in 90-95 days in kole lands. The Culture 24-20 can be an answer for the short duration rice with reasonably high yield for areas where such short duration rice is in demand.

iii) Among the 15 short duration rice cultures tested at the kole land situations, 10 following with the duration group of 80-90 days have out yielded the check variety Annapoorna. These cultures that are ideally suited for the kole land system in respect of duration and other characteristics will be further tested during the next Punja season.

iv) Joint application of carbofuran @ 0.75 kg ai/ha with 10 kg/N/ha as urea at 20 days after planting increases the rice yield and gives better over all pest control.

v) Application of benthiocarb @ 1.0 kg ai/ha at 6 days after sowing followed by a hand weeding at 30 days after sowing is the most effective and economical method of weed control in kole lands.

vi) For short duration rice in kole lands, higher fertilizer dose (100:35:35 kg NPK/ha) is found to give significantly higher grain yield (15.14% increase) when compared to the present recommended dose (70:35:35).

vii) In double crop kole lands, a medium duration rice (Jaya) followed by a short duration variety (Triveni) is found to be ideal.

viii) By applying nitrogen in the form of urea supergranules, the dose of nitrogen can be reduced considerably.

ix) Among the different pulses tested in kole lands, cowpea performed better and the variety Krishnamany recorded the highest grain yield.

x) In the cropping system involving tapioca as intercrop in banana var Nendran recorded the highest net return and 30.65% increase in profit.

xi) Seed treatment with molybdenum @ 1 g per kg of seed increases the grain yield in pulses.

xii) A paddy winnower cum cleaner has bean fabricated which has the efficiency of clearing 1000 kg/hour for grain purposes and 600 kg/hour for seed purpose.

Concluded projects

RICE

Evaluation of joint application of carbofuran with urea in transplanted rice.

Based on the result of this trial, a new recommendation was incorporated in the package of practices as "whenever carbofuran application is needed at around 20 days after planting, addition of 10 kg of N in the form of urea would be useful to obtain increased yields and better over all pest control. It is desirable that carbofuran is applied at 0.75 kg ai/ha"

Studies on weed control in kole land rice

The two years results have shown that application of benthiocarb @ 1 kg ai/ha at 6 days after showing followed by one hand weeding at 30 days after seeding is most effective and economic weed control method for kole land rice. This recommendation is also included in the package of practices

BANANA

Banana based cropping pattern

The cost benefit ratio worked out for different intercrops revealed that tapioca intercropped with banana was most economic. By planting tapioca along with banana, 30.65% increase in profit was obtained.

VEGETABLES

Effect of different levels of NPK on the yield of brinjal

This trial was conducted with three levels each (0,25 and 50 kg/ha) of N, P and K applied along with 20 t/ha of farm yard manure. The results showed that only N has got significant influence on the yield of brinjal. This shows that there is no need of applying fertilizers to brinjal over and above 20 t/ha of farm yard manure except N.

PULSES

Studies on the effect of rhizobium and molybdenum on pulses

Three independent experiments were conducted for cowpea, green gram and black gram. The result showed that seed treatment with molybdenum @ 1 g per kg of seed increases the grain yield in pulses.

Ongoing projects

RICE

Crop Improvement

Uniform Variety Trial - I

With an objective to evaluate the comparative performance of very early maturing selections, 21 test entries including check variety Triveni are being tried. Maximum grain yield of 5783 kg/ha was recorded by IET No 7988. A grain yield of 5155 kg/ha was recorded by the check variety Triveni

Uniform Variety Trial - II

The objective of this trial is to study the comparative performance of early duration varieties. Twenty six entries are being tested. Maximum grain yield of 2634 kg/ha was recorded by the IET No 8051

Preliminary variety trial - I

Sixty four test entries including check variety Annapoorna are included in the trial. Maximum grain yield of 6420 kg/ha was recorded by entry No. 525, and the check variety Annapoorna gave 5437 kg/ha.

Screening rice varieties cultures for drought tolerance/resistance

During the Viruppu season, the crop was not exposed to drought conditions in the early stages of growth due to receipt of sufficient rains, so screening could not be conducted

During the second crop season, the short duration varieties escaped drought to a certain extent. Culture-43-47-1 recorded the highest yield with a duration of 90 days. Among the medium duration varieties, Culture-79-60 recorded the highest yield followed by Culture-8.

Screening rice varieties/cultures for kole land

a) Evaluation of short duration varieties cultures in kole land

Ten cultures/varieties were evaluated in cultivators' fields in kole lands. Culture-23332 (Mutant of MN 54-42) recorded significantly higher yield followed by Jyothi, Triveni and Cul. 10-1-1. Considering the duration, rice colour and acceptability among farmers, Cul.-10-1-1 is a better suited variery for kole lands

b) Evaluation of medium duration varieties/cultures in kole lands

Thirteen cultures/varieties including checks were tested in a replicated trial in farmers field. Culture-8 (Triveni/IR 1857-78-1-3) recorded the highest yield followed by Culture-79-60 and Karthika. Culture-8, a red riced, semi tall rice culture can be recommended for adaptive trials in more locations.

Screening trial with short duration rice cultures

Three screening trials were laid out in the kole lands, with 19 cultures and Annapoorna as the check variety. One trial was vitiated

and the result from the two trials (Kanjani and Adat kole) revealed that 10 cultures falling within the duration group of 80–90 days have out-yielded the check variety Annapoorna. These cultures which are ideally suited for kole lands will be further screened in the next punja season.

Adaptive trial with short duration rice culture 24–20

The trial was conducted in 10 locations and the results showed that culture 24-20 gave a per day grain out turn of 42.94 kg/ha as compared to 40.36 kg ha from the check variety. Further trials are programmed for the next punja season.

Crop Management

Nitrogen management for dry sown low land rice

The objective of the project is to develop suitable nitrogen management technology for dry sown low land rice. There were twelve treatments including a control. The highest grain yield was recorded in treatment where urea super granules were applied with the seed in the same furrow at the time of sowing. Application of nitrogen fertilizer after weeding is also found to give better yield. The experiment will be continued.

Evaluation of joint application of carbofuran and urea in transplanted rice

The experiment was conducted for four seasons and the result revealed that joint application of carbofuran @ 0.75 kg ai/ha with 10kg-N ha as urea at 20 days after planting would be useful to obtain increased yield and better overall pest control.

Studies on weed control in kole lands

Two years results showed that application of benthiocarb @ 1.00 kg ai/ha at 6 days after sowing followed by one hand weeding at 30 days after sowing gave better weed control and highest grain yield.

Cropping system for double crop kole lands

The result showed that in double crop kole lands a medium duration rice variety (Jaya) followed by a short duration variety (Triveni) is found to be ideal

Fertilizer Management for kole land rice

a) *Short duration rice under direct seeding*

This experiment was conducted in farmers' field (Kanjani kole). The result showed that for short duration variety, a fertilizer dose of 110-35-35 kg NPK ha is suitable which recorded significantly higher grain yield than the present recommended dose (70-35-35)

b) Medium duration rice under transplanted condition

The experiment was conducted in farmers field (Kattukambal kole). There is positive response to nitrogen upto 130 kg N/ha. These experiments will be repeated during the Punja season 1986.

Fabrication and testing of paddy seed dibbler

A two row paddy seed dibbler has been developed. Efforts are being made to incorporate a fertilizer application with the dibbler.

Fabrication of paddy winnower

Paddy winnower cum cleaner has been fabricate, which has the efficiency of cleaning 1000 kg/hour for grain purpose and 600 kg/hour for seed purpose. Three models of paddy winnower cleaner have been developed under NARP programme.

PULSES AND OIL SEEDS

Crop Improvement

Comparative Yield Trial of groundnut Varieties

Varieties EC 117871, TMV-2 and MC-29 were found to give higher dry pod yield, among the thirteen varieties tested. The trial was continued during summer in rice fallows adding five varieties, thus totalling the number of varieties to 18 varieties. JL-4, JL-24 and Ga-163 are found to be suited for summer rice fallow cultivation.

Comparative Yield Trial of groundnut varieties as intercrop with tapioca

Eleven varieties of groundnut were evaluated as intercrop in tapioca (M4 variety). Among the eleven varieties tested, TMV-2 was found to give the highest dry pod yield (1223 kg/ha). It is evident that intercropping groundnut with tapioca, increases tapioca tuber yield.

Comparative Yield Trial of 23 sesamum varieties

Comparative yield trial of 24 sesamum varieties was conducted during the Rabi season 1984 in uplands and summer season 1985 in rice fallows. Varieties ACV-1, N-62-32 and ACV-2 performed better in rabi uplands while C-14-3 and ACV-2 were found to be suited for summer rice fallow cultivation.

Collection and maintenance of germplasm of annual seed crops

A germplasm of 200 varieties of groundnut, 120 varieties of sesamum and 12 varieties of sunflower and 6 varieties of castor were maintained.

Evaluation of pulses and oil seed varieties for their performance in kole lands

Six independent experiments were conducted in the farmers fields at two locations (Adat and Eravu). Seven cowpea varieties, 10 green gram varieties, 11 black gram varieties, seven sesamum varieties and seven groundnut varieties were included as treatments.

Cowpea

Among the cowpea varieties, Krishnamany recorded the highest yield followed by Russian giant and C-152.

Greengram

The highest yield was recorded by S-8 followed by PDM-11 and Co-2.

Blackgram

PU-19 recorded the highest yield followed by PSI and Co-2

Groundnut

Among the groundnut varieties, EC-117872 recorded the highest yield followed by TG-3 and MK-374.

Crop Management

Studies on the effect of rhizobium and molybdenum on pulses

Three seasons' results showed that seed treatment with molybdenum @ 1 gm per kg of seed increases the grain yield in pulses.

Studies on the effect of coating of cowpea seeds with massori phosphate

There is no significant effect on the yield due to the coating of cowpea seeds with massori phosphate. The experiment will be repeated during next season

Spacing trial for newly recommended groundnut varieties

The newly recommended varieties of groundnut viz. TG-14, Spanish improved and TMV-2 were planted at 6 spacings. The result revealed that closer spacing recorded higher pod yield. The experiment is to be repeated for confirmatory results.

Effect of sulphur and potassium on the growth and yield of groundnut

The objective is to study the effect of graded doses of sulphur and potassium on growth and yield of groundnut. There is no significant influence on the yield due to the application of sulphur and potassium.

VEGETABLES

Studies on the effect of graded doses of NPK on the yield of chillies

The objective of the study is to fix the optimum dose of NPK for chillies. The result revealed that nitrogen has got significant effect on yield. Effects due to P and K and Interaction were not significant

Studies on the effect of graded doses of NPK on the yield of bittergourd

To fix the optimum dose of NPK for bittergourd, an experiment was conducted during Rabi and Summer season. The highest yield was

recorded by NPK : 50 50 25 kg/ha during Rabi season and during and Summer season NPK : 50 25 25 kg ha recorded the highest yield

SPICES

Screening ginger varieties for homesteads

Out of the eleven varieties planted for seed multiplication only four varieties viz Anppo, Rio-de-genero, DGS 19 and Jorhat performed well. The seed rhizomes of the above four varieties are collected for further testing.

TUBER CROPS

Multilocational trial on tapioca hybrids

This project is undertaken in collaboration with CTCRI Trivandrum to test the performance of promising hybrids evolved by CTCRI The trial is in progress.

Multilocational trial on sweet potato

A multilocational trial for evaluating 3 hybrid cultures of sweet potato viz. Cul. No. 2743, 4116 and 4021, was conducted in 7 locations during the Kharif season. Two local checks were included for comparison. Though the local check 'IR-8' recorded the highest yield, the weevil infestation on the tubers was highest (19%). The weevil infestation on Cul. 2743 and 4116 was nil.

COCONUT

Fabrication of coconut dehusker

A coconut dehusker was fabricated and field testing and evaluation are in progress.

Elite seed garden of cashew

Eight selected promising varieties of cashew are maintained at the elite seed garden.

1.12 ALL INDIA CO-ORDINATED SPICES AND CASHEWNUT IMPROVEMENT PROJECT, MADAKKATHARA

The project was started on 18-2-1972 with Headquarters at the Cashew Research Station, Anakkayam, Malappuram District. As the area available was insufficient to lay out all the experiments envisaged under the project, the Headquarter was subsequently shifted to the Kerala Agricultural University, Main Campus, at Madakkathara on 1-5-1973.

The total area of the station is 15 ha.

Objectives

The major objectives of the project are to:

i) Identify high yielding cashew types by screening the existing germplasm collection.

ii) Evolve new types by hybridization.

iii) Standardise the technique of vegetative propagation suited to local conditions.

iv) Work out manurial schedule for cashew by conducting fertilizer experiments.

v) Evolve effective control measures against the pests and diseases affecting the crop.

vi) Standardise seedling selection in cashew.

vii) Conduct comparative yield trials with types collected from different cashew growing areas. for identifying types suited to the locality.

Ongoing Projects

Crop Improvement

Germplasm collection in cashew and description of varieties

Since the year 1976, a total number of 165 trees of 93 accession are being maintained at Madakkathara. Out of the 93 accessions maintained, eight accessions recorded an yield of more than 10 kg, the highest being 17.5 kg recorded by tree No. 2052 (Adhoor-26-2) followed by 17.0 kg by tree No. 1963 (Muliyar 1-2).

Breeding improved varieties by hybridization

The aim of the project is to evolve new high yielding types with high shelling percentage, medium sized nuts, compact flowering period, high sex-ratio and pest and disease resistance.

Out of the 163 F_1 hybrid progenies, 12 hybrid progenies have been identified as promising based on their performance upto 1984-85.

Tree Nos. 631, 682, 694	(ALGD—1—1 × H—3—13)
Tree No. 662	(ALGD—1—1 × BLA—139—1)
Tree No. 856	(H—3—13 × K—30—1)
Tree No. 1593	(BLA—139—1 × K—30—1)
Tree Nos. 1597, 1598, 1600, 1608	(BLA—139—1 × H—3—13)
Tree No. 1608, 1610	(ALGD—1—1 × K—30—1)

The highest yield of 24.80 kg was recorded by Tree No. 1608 followed by Tree No. 1597 (23.50 kg) and Tree No. 1600 (19.25 kg).

Comparative Yield Trial of Anakkayam selections and hybrid progenies

Sixteen promising types including same hybrids evolved at Cashew Research Station, Anakkayam are being compared.

The analysis of the yield data for 84-85 showed that the types differ significantly. The type NDR 2-1 gave the highest yield of 4.958 kg/tree followed by K-28-2 (4.208 kg).

Propagational trials in cashew

It was found from studies during the past 5 years that 'Epicotyl grafting gave more encouraging results at this centre as compared to budding, side grafting, veneer grafting etc. The technique of 'Epicotyl grafting' has been standardised and large scale production of grafts undertaken for distribution

Crop Management

Standardization of seedling selection technique

The objective is to correlate the size, weight etc. of nuts to seedling vigour, earliness, yield and other economic attributes of the tree

Out of the 150 numbers of seedlings of the 10 types planted in the field during 1978, only 108 plants are in position now

During the year 1984-85 only 36 trees yielded, the yield range being 0.400 kg to 6.600 kg per tree. Observations on growth parameters were recorded.

Observational trial

Observational trial on "Effect of foliar application of urea with insecticides".

An observational trial was laid out during 1984-85 to find out the efficacy and economics of foliar application of 0, 2, 3 & 4% urea combined with 0.05% endosulfan as compared to soil application. Three sprayings, first coinciding with the emergence of vegetative flushes second with the emergence of inflorescence and the third at fruit set initiation were given.

Treatment with 3% urea spray recorded the highest yield of 5.40 kg as compared to 2.20 kg by control treatment (no foliar or soil application of urea). Soil application of urea recorded 4.00 kg per tree.

Plant Protection

Insecticidal trial against 'Tea-mosquito' (Helopeltis antonii) in cashew

The trial was started during 1981-82 with the objective of finding out the most effective insecticide in controlling tea mosquito and other pests.

During the year 1984-85, the trial was conducted with eight treatments, replicated three times in an RBD. Each plot consisted of two trees.

During the trial period, the infestation of *Helopeltis* was negligible and hence no significant data could be obtained. Cashew leaf miner alone was the predominent pest noticed. Observations on larval counts showed significant difference between the treatments and control. All the treatments were equally effective in controlling the leaf miner. No significant difference could be observed among the different treatments with respect to yield.

Field evaluation of different prophylactic and curative treatments to formulate suitable methods of control for stem borer.

The object is to evaluate the different prophylactic treatments with a view to prevent the infestation of stem borer in cashew trees and to evaluate the efficiency of some treatments in controlling the attack of already infested trees.

The results indicate that prophylactic measures are much better than curative measures.

Application of Nuvacron EC @ 30 ml/tree with cotton wool after removing a flap of live bark showed mortality of larvae and pupae of stem borer.

The trial with Nuvacron EC for application to cashew trees by trunk implantation drip method indicated that this method is not suited for administering systemic insecticides to cashew trees.

Observational trial on control of cashew inflorescence pest with dimethoate

The trial was carried out during 1984-85 season, using cashew type K-22-1.

As the infestation of *Helopeltis* was very low, no useful data could be obtained. Cashew leaf miner alone was the predominent pest noticed during the trial period. Cent per cent mortality of leaf miner larvae was observed in all the dimethoate (0.06%) treated trees and also in carbaryl (0.10%) treated trees. No fresh attack of leaf miner was noticed in the treated trees after the first spraying.

Observational trial to control Helopeltis on cashew with Ekalux 25 EC

The trial was carried out during 1984-85 season using cashew type K-22-1.

As the incidence of *Helopeltis* was very low, no reliable data could be obtained. Cashew leaf miner alone was the predominent pest noticed. Cent per cent mortality of leaf miner larvae was observed in all the three dosages of Ekalux treated trees, viz. Ekalux 1000 ml/ha, Ekalux 500 ml/ha and Ekalux 600 ml/ha while no mortality was observed in control. No fresh attack of leaf miner was noticed in the treated trees after the first spraying.

Effect of combined sprays of insecticides and NAA on control of tea mosquito (Helopeltis antonii) and on yield of cashew

The experiment was laid out at this station during 1984-85 to find out the effect of combination sprays of endosulfan, phosphamidon and carbaryl with NAA on control of tea mosquito and yield of cashew.

The data revealed that the intensity of flowering was maximum in the treatment – phosphamidon 0.05% + NAA 100 ppm (86.67%). The maximum yield of 8.5 kg was obtained from the treatment NAA 10 ppm

as spray. Observations on inflorescence thrips revealed that the treatment having phosphamidon 0.05% + NAA 160 ppm as spray was the least effective in controlling inflorescence thrips.

Visitors to the Station

Prof. J. C. Ascenso from Brazil visited the station on 6-4-1984.

Mrs. J. S. Michel, Scientist, King John House, Salley, UK visited the station on 10-11-84.

Dr. S. S. Bains, Joint Commissioner, Ministry of Agriculture, Govt. of India visited the station on 19-12-1984.

Dr. Md. Azizul Haque, Department of Horticulture, Bangladesh Agricultural University visited the station on 29-3-85.

Highlights

The high yielding type BLA 139-1 has been released as a new variety of KAU by name Ambikayam-1 during the year.

Results of concluded fertilizer trial revealed that N at 500 g/tree gives significantly higher yield over no-nitrogen treatment.

Bark treatment with Nuvacron EC at 30 ml/tree was found effective in killing the larvae and pupae of stem borer.

1.12.1 MULTI STATE CASHEW RESEARCH PROJECT, MADAKKATHARA

The Multi State Cashew Research Project started functioning at the Cashew Research Station, Madakkathara from 15-2-1982. The World Bank aided project obtained the technical and administrative sanction from the Indian Council of Agricultural Research, New Delhi as per F. 4-3/78 (H & MC) dated 24-7-1981. The sanctioned duration of the project was for 5 years from 1980-81 to 1984-85 at the first instance, subsequently extended upto 31-3-1986 (1985-86) subject to approval by funding agency as per ICAR's No. 26(1) 84 HMC dated 1-7-1985.

The major objectives of the project are the following :

i) Standardisation of vegetative propagation techniques in cashew—testing different propagation techniques on large scale for extensive adoption under field conditions and establishment of progeny nurseries and clonal multiplication plots.

ii) Establishment of trial cum demonstration cum multiplication plots in cashew with improved recommended types in Institutions and cultivator's fields.

iii) Demonstration on package of practices in cashew including chemical and sanitational control of pests and diseases.

iv) Training of field staff (Agricultural Demonstrators and Malis) in cashew propagation and cultivation.

Research

No. of research projects as on 31-3-1985 is 6.

Ongoing Projects

Standardisation of vegetative propagation in cashew—Testing different propagation techniques on large scale for extensive adoption under field conditions

Besides collecting data on various aspects of layering and epicotyl grafting, large scale production of layers and epicotyl grafts was undertaken.

During 1924-85 season, 4300 air layerings were done of which 1730 successful air layers were separated and distributed to farmers through Department of Agriculture which worked out to a final success of 40 23%. A total number of 2300 epicotyl grafts were done which gave a final take of 50—60%.

Establishment of progeny gardens

Two gardens at Madakkathara (1.03 ha) and another at Central State Farm, Aralam (10 ha) were maintained using 15 varieties/types at Madakkathara and six varieties types at Aralam. The yield data of the individual trees in the progeny gardens at Madakkathara were recorded separately during 1984-85. The highest yield was recorded by NDR-2-1 (12.42 kg per tree).

At Central State Farm, Aralam, air layers of hybrids were planted to enrich the progeny orchard.

Establishment of progeny nurseries (Quick multiplication plots)

Three progeny nurseries using six varieties/types of cashew established at Cannanore, Wynad and Trichur districts during 1983-84 were maintained.

The close-planted progeny orchard at Madakkathara was expanded by planting 63 more vegetative nursery plants of the type BLA-139-1 which was released by KAU as Anakkayam-1.

Trial cum demonstration cum multiplication plots with recommended types of cashew adopting efficient propagation technique

Two trials in Institutions (high range area) and 8 trial plots in cultivators fields distributed in the districts of Palghat, Cannanore, Calicut, Malappuram, Wynad and Trichur were maintained. Observations on field establishment and growth parameters were recorded.

Demonstration plots on package of parties including chemical and sanitational control of cashew pests and diseases

Experiments of the eight demonstration plots laid out in four districts of Kerala (Viz. Cannanore, Calicut, Malappuram and Palghat) to demonstrate the advantages of adoption of recommended package of practices during 1983-84 were continued during this season also.

The yield data revealed that adoption of plant protection measures and fertilizer application contributed for perceptible increase in yield

Trial on control of cashew pests efficiency of aerial spraying-ULV sprays

Trial to evaluate the efficiency of ULV sprays of insecticides applied aerially using helicopter for the control of tea mosquito and other pests was conducted for three consecutive years from 1982 and the results obtained after statistical analysis revealed that endosulfan was superior to other treatments in controlling tea mosquito in cashew. Phosphamidon was found to be least effective against these pests. For controlling leaf miner and inflorescence thrips, quinalphos followed by endosulfan was found to be most effective. Phosphamidon was least effective in the control of leaf miner. Nut yield was maximum in quinalphos and endosulfan treated plots.

Training of field staff in cashew propagation and cultivation

Under the training programme 149 personnel of different categories were trained in cashew cultivation during the season.

A total number of 11 seminars were organised in different districts in which 178 cultivators participated.

Highlights

Epicotyl grafting was found to be a successful method of vegetative propagation in cashew under Kerala conditions.

During 1984-85, a total number of 4300 air layerings and 2300 epicotyl graftings were done and distributed among the cultivators through the Department of Agriculture.

The progeny garden of 15 types established in 1977 at Cashew Research Station, Madakkathara was maintained of which the highest yield was NDR 2-1 (12.42 kg/tree).

Air layers of 11 more hybrids were planted at Central State Farm, Aralam to enrich the progeny orchard.

The close planted progeny orchard at Madakkathara was expanded by plant in 64 more vegetative nursery plants of the type BLA-139-1 which was released by KAU as Anakkayam-1.

Eight demonstration plots on package of practices were established in the districts of Cannanore, Calicut, Malappuram and Palghat. The yield data revealed that adoption of plant protection measures and fertilizer application contributed for perceptible increase in yield.

The trial to evaluate the relative efficacy of ULV sprays of insecticides applied aerially using helicopter revealed that endosulphan was superior to other treatments in controlling tea mosquito, in cashew. For controlling leaf miner and inflorescence thrips, quinalphos followed

by endosulfan was found to be most effective. Phosphamidon was the least effective in the control of these pests. Nut yield was maximum in quinalphos and endosulfan treated plots.

Under the training programme 140 personnel of different categories were trained in cashew cultivation during the season, bringing the total to 474 from the inception of the scheme. A total number of 11 seminars were organised in different districts, in which, 178 cultivators participated.

1.13 BANANA RESEARCH STATION, KANNARA

Research on Banana and Pineapple in the State was started in Kerala in 1958 at Mannuthy under a scheme financed partly by ICAR. Since the area available was not enough, the present site at Kannara having an area of 19.7 ha was acquired in 1963 and the Scheme was shifted from Mannuthy to Kannara. In 1970, the All India Co-ordinated Fruit Improvement Project was sanctioned and the research programme on banana and pinsapple under the project was brought under the Banana Research Station, Kannara. In 1974, the venue of Pineapple research was shifted to Vellanikkara, in an area of 7 ha, having a better suited soil for pineapple.

The major objectives are to improve the varieties of banana and pineapple by introduction, selection and hybridisation, to standardise the management practices and to find out suitable control measures for pests and diseases of these crops. The station is located 3 km west of Kannara at Marakkal. The geographical location is at 10° 05'' N latitude and 76° 17'' longitude at an elevation of 55.60 M above MSL. The soil is lateritic loam and alluvial in some pockets.

Sri P. A. Varkey, Associate Professor continued to be in charge of station till 3.12.1984 and Dr. K. Pushkaran took charge of the station on 4.12.1984 and continued to be in charge of the station.

Sri P. K. Rajeevan, Asst. Professor was relieved on transfer to RARS, Pilicode on 5.6.84. The post remained vacant upto 9-1-85 when Sri B. R. Reghunath joined duty.

Sri. Job Sathyakumar Charles, Asst. Professor (Nematology) entered on study leave from 11-4-84 and the post was vacant since then.

Smt C. K. Geetha, Jr. Asst. Professor was relieved on transfer to RARS, Pilicode on 5-6-84 and the post remained vacant upto 21-7-84 when Smt P. V. Nalini took over charge.

Smt. A. K. Baby Latha, Jr. Asst. Professor joined duty on 9-11-84 in the station.

Sri. Job Sathykumar Charles, Asst. Professor, was granted study leave for undergoing Ph. D. Course in Entomology at College of Horticulture, Vellanikkara.

No of research projects as on 31 3 85 was 27

Sri Hem Borah Research Fellow Gauhati University, Assam visited this station on 8 2 85 Dr George Wilson Chief Agronomist IITA, Ibadan visited this station on 6 3 85. Dr M D Azizul Haque, Bangladesh Agricultural University visited this station on 27 3 1985

Research Highlights

BANANA

Crop Improvement

The studies conducted on the triploid crop of forty varieties of banana revealed that the varieties Kapot, Nendrasaboon, Pachachungan, Nanmai, Pisang Ibin, Sirumalai, Virupakshi, H 135, Palayankodan, Manmai, Vannan, Ladies finger, Padyli moongil and Nendrakunnan are suitable for ratooning

Among the four banana hybrids obtained one hybrid obtained from the cross between Agniswar x Pisang Ibin was harvested This was found to combine the desirable attributes of both the parents The hybrids are under critical evaluation

Out of the sixteen Nendran clones evaluated during the last year, five clones found promising were selected and raised during the year under two levels of fertility These clones will be further tested in multilocational trials during the coming year

Crop Management

The results of three years' trial on raising different intercrops in nendran banana indicated that cucumber and amaranthus are the best intercrops in Nendran banana planted during September-October The population density trials in Poovan and Palayankodan suggested that wider spacing ie above 2m yielded better bunches for the market

The general appearance of the bunch and individual finger size were improved in Palayankodan by trimming one or two terminal hands immediately after the female phase without affecting the bunch weight This may be of help to fetch a better market price

In the nutritional trial with Palayankodan variety of banana, N @ 150 g/plant and K_2O at 200 g/plant were observed to be the optimum. The trial is to be continued to confirm the results

Plant Protection

Studies on integrated management of pests and diseases were conducted for two years The results suggested that applying 20 g Carbofuran 3G around the rhizomes at the time of planting followed by leaf axil filling of Carbofuran 3G at 20 g plant twice on 75 and 165 DAP or application of Phorate 10G 20 g plant around rhizomes at the time of planting followed by leaf axil filling of Phorate 10G at 20 g plant twice

on 75 and 165 DAP effectively check the important pests such as rhizome weevil, nematode and aphids. The control of aphids will lead to the indirect control on the spread of dreadful bunchy top disease. 1% prophylactic spray of Bordeaux mixture at the beginning of monsoon is also required to control the leaf spot disease. Among the two pesticides tried, the Carbofuran treatment is superior in terms of higher bunch weight.

The studies were continued to find out suitable control measures using fungicides against leaf spot disease of banana. The studies revealed no significant difference among the different fungicides with respect to disease incidence, bunch weight and other characters. However Power oil 1% was the best.

The results obtained in the study on the effect of sucker dip treatment with six insecticides for the control of rhizome weevil suggested that eventhough no significant difference was obtained, Phosphamidon 2% was the best, followed by Methyl demeton and Quinalphos 1% for reducing rhizome damage

The study conducted to evaluate the efficiency of antagonistic crops like Tagetes, Crotalaria, Asperagus and *Alpinia galanga* over Carbofuran in checking nematodes, it was found that carbofuran was the most effective in checking burrowing nematode as compared to the antagonistic crops

The studies on the control of banana rhizome weevil with insecticides applied around the rhizome in the soil revealed that soil application of Phorate, Thidemeton and Carbofuran @ 20 g/pit at the time of planting and again 25 g/plant three months after the first application significantly reduced rhizome damage

PINEAPPLE

Crop Management

The data obtained on mulching studies indicated that mulching with pineapple leaves have beneficial effects of giving higher fruit weight/plant, desirable taper and canning ratios. The result has practical utility since pineapple waste including leaves is available in plenty in a pineapple tract

Concluded Projects

BANANA

Plant Protection

Integrated management of pests and disease in banana variety Nendran

This experiment was conducted for two years. The results obtained during the year on the second crop revealed that the treatment Phorate+Power oil (applying Phorate 10 G in the soil at 20 g/plant around the rhizomes at the time of planting plus leaf axil filling at

20 g plant twice on 75 and 165 DAP and spraying Power oil 1% soon after the commencement of initial symptoms of the leaf spot disease) recorded significantly higher bunch weight of 9.87 kg. Carbofuran + Bordeaux mixture (soil application of carbofuran 3G at 20 g plant around rhizomes at the time of planting plus leaf axil filling at 20 g plant twice on 75 and 165 DAP and spraying 1%. Bordeaux mixture soon after the commencement of initial symptoms of leaf spot disease) was the next effective treatment in recording significantly higher bunch weight. Rhizome damage by weevil was also the least in Phorate + Power oil treatment. Nematode population in the root was the least in Carbofuran + Bordeaux mixture treated plot. This finding was accepted as one of the recommendations for the new package recommendations.

Ongoing Projects

Crop Improvement

Varietal studies in banana

In order to evaluate a widely divergent genetic stock of diverse origin and to select and popularise promising varieties, a total number of 129 varieties were maintained and compared. The results during the year revealed that wide variation existed among the varieties regarding the morphology, metric traits including yield as well as duration and reaction to pests and diseases. In general, diploid *acuminata* types (AA) produced comparatively small bunches whereas the bunches produced by culinary varieties (ABB) were heavier. Other triploid banana (AAB and AAA) produced medium to heavy bunches. The heaviest bunch was produced by Chakkia (17.8 kg). In duration, the earliest was Pisang lilin (270 days) while the longest was Ney vannan sawai (461.5 days).

Breeding investigations in banana

With the objective of creating genetic variation in important economic traits such as height, pest and disease resistance and yield in banana and to select better recombinants, hybridisation work was taken up during 1983. Out of the 62 seeds obtained from the five crosses involving Pisang lilin as male parent, only four seeds belonging to four different crosses germinated. The four hybrid plants obtained were maintained. Out of these, one hybrid (H 7-4) (Agniswar x Pisang lilin) produced the bunch in 250 days and the bunch was found to be acceptable as a table variety. The hybrid has to be tested further.

The other three hybrids are being maintained. Four suckers obtained from H 7-4 were planted along with the parents for critical comparison.

Combination breeding in banana

This investigation was takan up during the year to examine the possibility of combining desirable economic characters like high yield,

superior quality, earliness, dwarf stature, disease and pest resistance through hybridisation. The programme envisages crossing of 8 male parents with 14 important varieties.

During the year, 15 crosses were made involving 34 bunches with 2187 flowers. The bunches are yet to be harvested. Hybridisation work is continued.

Clonal variation studies in banana var. Nendran

The study was initiated during 1978-79 with the aim of assessing the natural genetic variability existing in the popular variety of banana viz. Nendran and to select promising clones for popularisation. Out of 144 clones collected from different places, the selected 16 clones were grown during the year. The results revealed that the clones did not differ significantly in bunch weight and number of hands. Though not significant, the clone 132 produced the heaviest bunch followed by clone No. 134. The number of fingers was the highest for clone No. 134 followed by clone No. 100

Bunch weight of the sixteen selected clones for the three years were pooled and the analysis revealed that the clone No. 49, 100 and 132 were on par and significantly superior to the others. Clone No. 35 stood next followed by 123. These five clones were planted during the year under two levels of fertilizers for further studies

Induced mutagenesis in banana var. Nendran

In order to induce genetic variation in economic traits such as height, disease and pest resistance and yield in banana var. Nendran, this programme was initiated. The suckers irradiated with gamma rays did not show any marked difference with respect to any of the characters in the first generation

The suckers from the irradiated mother plants were collected and grown for observation.

Crop Management

Population density trial in banana varieties Palayankodan and Poovan

With the objective of standardising the optimum spacing and best method of planting to obtain maximum yield per unit area, two experiments were conducted separately one for 'Palayankodan' and the other for 'Poovan'

The experiment with Palayankodan was conducted for two years as the plant and ratoon crops. The results revealed that none of the characters studied were influenced by the different spacings and two methods of planting viz., square and rectangular tried. However, the highest bunch weight was recorded by widely spaced plants ie plants

spaced above 2m x 2m. The plants under closer spacing (1.5 x 1.5m) were taller and produced bunches of poor quality after two months of the normal time. Some plants under the treatments were damaged by wind.

The data with Poovan variety of banana indicated that as in the case of Palayankodan, the characters studied were not significantly different. However, comparatively better bunches were produced by widely spaced plants than closely planted ones. A new crop was planted during the year and the experiment is in progress.

Nutritional requirement of rainfed banana var. Palayankodan

To find out the optimum requirement of N, P and K for Palayankodan, under rainfed conditions, an experiment was started during 1978 with three levels of N i.e. 0, 150 and 300 g/plant, three levels of P i.e. 0, 50 and 100 g/plant and three levels of K i.e. 0, 200 and 400 g/plant. So far, studies were completed on three plant crops, two first ratoon crops and one 2nd ratoon crop. During the year, the 3rd plant crop and the 2nd ratoon crops were harvested.

The data obtained on the third plant crop revealed that at flowering the vegetative characters like height, girth and number of functional leaves were not significantly influenced by the different levels of N, P and K.

The bunch weight differed only with the different levels of K. K at 400 g/plant recorded the maximum bunch weight of 9.61 kg and was on par with K at 200g/plant (9.01 kg). The number of hands and number of fingers were not affected by the varying levels of N and K. The weight, girth and length of fingers were significantly higher in N_1 and N_2, which were on par. K_1 and K_2 recorded significantly higher weight, length and girth of fingers and these treatments were on par. The days for flowering and total duration were not significantly affected by the levels of N and K.

The different levels of P did not make any significant effect in any of the characters studied.

The data obtained from the 2 nd ratoon crop revealed no significant difference among the treatments.

Effect of bunch trimming on yield on banana var. Palayankodan

The studies revealed that for obtaining better appearance and uniform fingers in Palayankodan banana, it is advisable to remove one or two terminal hands immediately after the female phase. The experiment is continued in the 2nd ratoon crop.

Plant Protection

Control of banana rhizome weevil by insecticidal treatment of suckers

Treating suckers with insecticides at the time of planting considerably reduced rhizome damage by weevils and all the six insecticides

ie. Dimecron 2%, Ekalux 1%, Nuvacron 2%, Rogor 1%, Sevin 2% and HCH 2% were more or less equally effective.

Control of banana rhizome weevil with insecticides applied around the rhizome in the soil

In order to find out how far the soil application of insecticides will help in checking the infestation by rhizome weevil, this experiment was continued during the year.

The results revealed no significant difference among the treatments with regard to all the characters studied. Though the treatments did not differ significantly, the highest bunch weight (7.82 kg) and number of fingers (52) were recorded by Thimet (20 g in the pit at planting and 25 g after 3 months of planting) treated plants, followed by Chlordane (100 g each at planting and 3 months after planting in the pit) Sevin 50%, (20 g/pit at planting and 25 g/pit after 3 months) and Furadan (20 g pit at planting and 25 g pit after 3 months).

Control of the burrowing nematode of banana using intercrops

With the objective of evaluating the effect of repellent crops like Tagetes, Crotalaria, Asperagus and *Alpinia galanga* and Carbofuran on the yield and control of banana nematodes, the experiment was continued during the year.

The results obtained during the year indicated that the highest bunch weight was recorded by carbofuran treated plants followed by the plots planted with *Alpinia galanga*. Carbofuran treatment also recorded higher values in plant height and number of leaves. The lowest nematode population was obtained in plants intercropped with Asperagus followed by *Alpinia galanga*. The total duration of the crop was the lowest in plants intercropped with *Alpinia galanga* though statistically not significant.

Fungal diseases of banana and their control

To find out suitable control measures against leaf spot diseases of banana by spraying different fungicides, six fungicides viz., Bordeaux mixture 1%, Power oil 1%, Bavistin 0.12%, Power oil 1% + Dithane M-45 0.2%, Difolitan 0.3% and Dithane M-45 0.2% were tried. Three sprayings with the above fungicides wer given at monthly intervals with the onset of S W monsoon showers in banana var. Nendran. Eventhough, there was no significant difference between the various treatments on yield characters, the highest bunch weight (7.09 kg) was recorded by Bavistin treated plants. In the percentage of infection also Bavistin treated plants exhibited the lowest incidence (42.89%) though no significant difference was obtained.

PINEAPPLE

Crop Improvement

Varietal studies in pineapple

The twenty five varieties collected so far are being studied. The morphological attributes of the varieties were recorded. The experiment is in progress

Clonal variation studies in pineapple var. Kew

In order to assess the natural genetic variability existing in the popular pineapple variety 'Kew' and to select the promising types, this project was taken up during 1981. So far nine clones were collected from 7 districts and these types are being maintained for further studies

Breeding new varieties of pineapple

With the objective of improving the fruit characters and quality attributes of the commercial variety 'Kew' and to develop new varieties for table pupose having high yielding capacity, hybridisation was undertaken during the year. The varieties viz. New Queen, Singapore Spanish, Valera Moranda, Codical, Kallara local and Espinola Roja were crossed with Kew and their reciprocal crosses were also done. From the 833 flowers pollinated 1676 seeds were obtained. But the seed germination was very poor and only 17 seeds germinated. The survival of the seedlings were too poor and they failed to establish in rpite of all possible efforts

Crop Management

Mulching studies in pineapple

This experiment was started during 1982 to find out the effect of mulching on conservation of soil moisture and yield in pineapple. During the year, the data on flowering percentage, fruit characters and yield of the plant crop were recorded. The five mulching treatments did not record any significant effect in any of the characters

Mulching with pineapple leaves had the added advantage of low crown weight and desirable taper and canning ratios when compared to mulching with chopped banana pseudostem

Nutrional requirement of pineapple var. Kew

In order to find out the optimum requirement of N, P and K for 'Kew' variety of pineapple, this experiment was started during 1983. The results revealed that fertilizing pineapple with N, P and K influenced biometric characters.

Ratooning under high density planting of pineapple

To find out the optimum spacing for planting pineapple for taking more than two ratoon crops economically, this experiment was laid out

during 1983 with seven spacing levels. The results obtained on the biometric characters 18 months after planting revealed that the planting densities did not affect the characters significantly.

Standardisation of depth of trench for planting Pineapple

This experiment, to find out the optimum depth of trench for planting pineapple, was started during 1980. During the year, data were collected from the first ratoon crop. The results indicated that the flowering percentage, fruit yield plant with and without crown and crown weight did not show any significant difference due to treatments.

Fruit yield on per hectare basis showed significant difference due to treatments. Spacing 25 x 60 x 90 cm and 30 cm depth recorded the highest fruit yield (64.867 tons ha). It is inferred that high density planting (53.333 plants ha) is better than low density planting (44 444 plants ha). For high density planting, deep trenches are preferable.

Plant Protection

Investigation on the 'marbled fruit' of pineapple

To study in detail, the incidence, etiology and control measures of the disease known as 'marbled fruit' of pineapple, this experiment was started during the year and is in progress.

1.14 AGRONOMIC RESEARCH STATION, CHALAKUDY

The station was originally established by the Kerala State Department of Agriculture in 1962 at Pariyaram near Chalakudy to carry out studies on water requirement and cropping patterns to be adopted for the irrigated areas, in 2 ha. of leased land. That scheme was wound up in 1970. Later on, the research station was re-established at the present site in 1972 in an area of 8.95 ha acquired by the Department of Agriculture under the scheme for conducting agronomic research in irrigated areas. The station along with the staff was taken over by the Kerala Agricultural University in 1973 for implementing the co-ordinated project for Research on Water management sponsored by ICAR. The scheme has started functioning at this centre from July 1974 onwards. The administrative office and laboratories of the station started functioning in the new laboratory block from 9-6-1980 onwards. In addition to ICAR sponsored projects, agronomic studies which have relevance to irrigated agriculture have also been implemented as university projects.

The NARP sub-project for water management studies in the central region of Kerala was started under the technical and administrative control of this centre from 1983-'84 onwards.

The research station is situated in the northern side of the Chalakudy-Sholayar road about 400 meters away from the Chalakudy town. The station is located at 10°20' North and 76°20' East and at an altitude of 3.25m above MSL.

The total area of the farm is 8.95 ha comprising of 7.05 ha of wet-land and 1.90 ha of upland. The area runs to a fine gradient to south west and wetlands are formed into blocks and plots.

The major objectives of the centre are to develop cropping patterns suitable for varying water management and fertility situations, test new crops and varieties for their adaptability and performance under different moisture conditions, estimate the water requirement of rice, pulses, oil seeds, vegetables, banana, tapioca and other important crops of Kerala, evolve suitable measures to increase water use efficiency of crops, work out economics and optimum schedules of irrigation for important crops cultivated in the region, study the ground water and recycling of drainage water for irrigation, find out cheap and efficient methods of irrigation for important crops, conduct operational research programme on water management in the command area.

Dr G. R. Pillai, Professor of Agronomy continued to be in charge of the station.

The NARP sub project for water management studies in the central region of Kerala that has started functioning during the previous year, continued to operate under the technical and administrative control of this research station at various locations.

Under the ICAR sponsored co-ordinated Project for Research on water management, an operational research project (ORP) in water management, was implemented at Palissery with a view to test the field applicability of the research findings on the different aspects of irrigation water management in rice and rice based cropping systems under varying constraints of irrigation water supply. The study was conducted in a compact area of 20.8 ha of rice fields owned by 75 farmers. With the adoption of scientific crop management practices especially improved water management practices, the farmers could increase the rice yield during the third crop season from the normal levels of 12.4 - 14.5 q ha to 31.5—36.0q/ha.

An area development programme was simultaneously implemented in the ORP area at Palissery aiming at the integrated development of the locality under the Lab to Land programme. Under the village adoption programme, Kothakulangara village was adopted by this centre from the reporting year onwards and various agricultural extension programmes were implemented in this village under this programme.

In the educational front, the research station successfully organised two trainings in water management to the officers of the Departments of Agriculture, Irrigation and CADA, the three major agencies dealing with agricultural water management in the state. These were (1) Training on water management to the third level officers of the Departments of Agriculture, Irrigation and CADA. (2) Training on water management to the Junior Agricultural Officers of the Department of Agriculture.

The large scale training programme on water management that was started during the year 1983-84 for transferring the latest knowhow in water management to the field staff on the departments of Agriculture, Irrigation and CADA, the three agencies dealing with agricultural water management in the state, was continued during the year 1984-85 also. 79 Officers in six batches during 1983-84 and 312 officers in 18 batches during 1984-85 participated in these training courses, each having a duration of seven days. Of the participants, 302 officers were Agril. Demonstrators, 43 Overseers, 23 Draftsman and 23 Work Superintendents, 292 trainees were from the Department of Agriculture, 66 from the Department of Irrigation and 33 from CADA. Apart from theory classes, the trainees were exposed to the various water management experiments being implemented at the research farm and the ORP in water management in farmer's fields

A 7 day training programme on water management was organised by the centre for the Junior Agricultural Officers of the Department of Agriculture during 15-10-84 to 20-10-84. Twenty nine officers representing the different districts of the State participated in the training.

A one day 'Kisan Mela and Farm Clinic' was organised under the Lab to Land and and village adoption programmes in the Operational Research Project area at Palissery on 27-2-85. About 150 farmers actively participated in the programme

A batch of fourteen B.Sc (Ag) trainees were given field training for a week from 16-9-84 to 23-9-84 on different aspects of farm and crop management

Dr G R Pillai Professor of Agronomy and Sri Jose Mathew, Assistant Professor of Agronomy attended the 10th All India workshop of the Co-ordinated Project for Research on Water management held at Mahatma Phule Agricultural University, Rahuri, Maharashtra from 10-9-1984 to 13-9-1984

Sri Jose Mathew, Assistant Professor of Agronomy attended the training in audiovisual aids and Communication media held at Communication Centre, Mannuthy from 18-2-1985 to 22-2-1985

Number of Research Projects as on 31-3-1985 were 16.

Research Highlights

Concluded projects

Weed control in dry sown rice under different water management practices

The study comprised of five water management practices and five weed control treatments

Among the water management practices, continuous submergence of 5 ± 2 cm recorded the highest yield of grain but was on par with 7cm irrigation one day after the disappearance of ponded water

With regard to weed control measures, pre-emergent application of Goal @ 0.24 kg ai/ha has significantly out yielded all other weed control measures. Among the other treatments, benthiocarb, Stomp and hand weeding were on par and was significantly superior to unweeded control

Ongoing Projects

Effect of various water regimes and nitrogen levels on yield of rice

Studies were conducted to formulate on optimum irrigation schedule for transplanted short duration rice varieties under different levels of nitrogen during the second crop seasons of 1983-'84 and 1984-'85. Four water management practices and four nitrogen levels constituted the treatments. The nitrogen levels significantly influenced the grain yield whereas the water management practices and interaction did not.

From the two year study which showed identical results, it was inferred that under condition of water scarcity during the second crop season irrigation for rice can be postponed up to five days after the disappearance of ponded water especially in areas where the ground water table is shallow and evaporative demand less.

The study also revealed that application of 70 kg N ha is optimum for short duration rice variety under all water management conditions.

Effect of various water regimes and nitrogen levels on the growth and yield of rice (Alathur-NARP)

The experiment was conducted with a view to find out an optimum water management practice for rice under different levels of nitrogen under Alathur situations during second crop season. The test variety was IR-20. Four nitrogen levels (0, 45, 90 and 135 kg N/ha) and four water management practices in factorial combination constituted the treatments.

Statistical analysis of the data indicated the significant effect of nitrogen levels on the grain yield of rice whereas the effect of water management practices and interaction were not significant

Among the nitrogen levels, the highest yield was recorded by 135 kg N/ha which was significantly higher than the lower doses of itrogen. This dose is 50 percent higher than the recommended dose f 90 kg N/ha for medium duration rice varieties.

The grain yield among the different water management practices did not vary significantly. Hence considering the grain yield data and

less irrigation requirement, it can be inferred that irrigation for medium duration varieties during second crop season at Alathur locality can be delayed up to five days after the disappearance of ponded water.

FRUITS AND FLORICULTURE

Concluded Project

Scheduling irrigation to pineapple under mulched and exposed condition

Trials were initiated during 1981-'82 and concluded during the year under report, with four water management practices (IW/CPE ratio of 0.3, 0.6 and 0.9 and no irrigation) under mulched and exposed condition to study the effect of various levels of irrigation and mulches on the fruit yield of pineapple. The plant crop was harvested during 1982-'83 and the two ratoon crops were harvested during the subsequent years. The effect of irrigation treatment on the fruit yield differed in the different years. However the aggregate fruit yield of the plant crop and the tworatoons indicated the superiority of 0.9 IW/CPE ratio among the different water management practices but it was comparable with 0.6 IW/CPE ratio. Mulching the basins of pineapple with dried leaves at the time of planting considerably improved the fruit yield in all the three crops. In short the study revealed that irrigating at 0.6 IW/CPE ratio during summer seasons and mulching the basins at the time of planting can be recommended for higher fruit yield and better water use efficiency in pineapple.

PULSES AND OILSEEDS

Ongoing Project

Response of cowpea to water management practices and phosphorus

This experiment was initially taken up during 1981-'82 and was repeated during 1984-85. Five water management treatments (Irrigation at three critical stages of branching, flowering and pod formation and IW/CPE ratio of 0.25, 0.50, 0.75 and 1.00 with 50 mm water) and four levels of phosphorus (0, 15, 30 and 45 kg P_2O_5/ha) constituted the treatments. During both the years of study, the grain yield was significantly influenced by the different levels of water management whereas the effect of phosphorus and that of interaction were not significant. From the study, it was observed that irrigation at 0.75 IW/CPE ratio (at about 15 days interval) or at critical stages (branching, flowering and pod formation) is the optimum water management practice for cowpea grown in rice fallows during summer season, from the point of view of water economy and increased grain yield.

Effect of various irrigation schedules on the growth and yield of sesamum under graded doses of nitrogen

It was the second year of study which was previously conducted once during 1982-'83. The study was conducted with five water management

practices (No irrigation and irrigation at 0.25, 0.50 and 0.75 IW/CPE ratio and at critical stages of 3-4 leaf stage, branching, flowering and pod formation) and four nitrogen levels (0, 15, 30 and 45 kg N/ha). The study revealed that the grain yield of sesamum was significantly influenced by the different water management practices and nitrogen levels but not by their interaction. The two year study indicated that irrigating sesamum at critical stages of 3-4 leaf stage, branching, flowering and pod formation or at 0.75 IW/CPE ratio will ensure significantly higher grain yield as compared to unirrigated or less frequently irrigation crops. It is also inferred from the study that 30 kg N/ha is sufficient for higher grain yield in irrigated sesamum.

Response of groundnut to phosphorus and potassium under different water management practices

The trial was conducted previously once during 1981-82 and was presently repeated for the second time. The treatments were factorial combination of three leaves each of irrigation (0.03, 0.5 and 0.9 IW/CPE ratio), phosphorus (25, 50 and 75 kg P_2O_5/ha) and potash (25, 50 and 75 kg K_2O/ha). Different levels of irrigation significantly influenced the pod yield of groundnut during both the years of study, whereas the effect of phosphorus and potassium and the different two factor interaction were not significant. The results suggest that irrigation for groundnut during summer season is to be scheduled at 0.9 IW/CPE ratio (50 mm depth) for ensuring increased pod yields. It requires about eight irrigations and 400 mm of water. Application of phosphorus and potassium at doses higher than 25 kg/ha was not found necessary for higher pod yields.

Response of groundnut to different irrigation schedules and phosphorus levels (Alathur - NARP)

This experiment was conducted in a farmer's field at Alathur during summer season. The trial consisted of four levels of irrigation (0.25, 0.50, 0.75 and 1.00 IW/CPE ratio) and four levels of phosphorus (0, 30, 60 and 90 kg P_2O_5/ha) and the variety used was TMV-2. Statistical analysis of the data indicated that both the water management practices and phosphorus levels significantly influenced the pod yield of groundnut whereas the interaction effect was not significant.

The water management practices showed an increasing trend upto 0.75 IW/CPE ratio were upon the yield declined. This shows that irrigation at 0.75 IW/CPE ratio is optimum for groundnut for increased pod yields at Alathur locality.

With incremental doses of phosphorus, the pod yield showed an upward trend upto 60 kg P_2O_5/ha and thereafter the yield declined. This indicates that irrigated groundnut responds only upto 60 kg P_2O_5/ha under Alathur condition.

Concluded Project

Soils and Agronomy

Evaluation of moisture retension and release characteristics of different soil types of Chalakudy irrigation project command area

The project was taken up to work out the soil moisture retension and release characteristics of sixteen major soil series of Chalakudy irrigation project command area. The soil moisture retension characteristics of the soil samples collected from seven different depths (0-15, 15–30, 30-45, 45-60, 60–90, 90-120 and 120-150 cm) of the sixteen soil series were evaluated. Mechanical composition and other relevant physical properties of the soil samples were also worked out and correlated with soil moisture retension values.

The study indicated that garden land soils and wet land soils in which garden land crops are cultivated contain appreciable amount of gravel and vary widely in soil moisture content, unlike wet land soils. Uniformity in texture in different depths could be noticed only in few wet land soils like Kizhupillikkara, Edathuruthy, Konchira and Perumpuzha. The available moisture content in general was higher in the lower layers than the surface ones in most of the series. The moisture retension curves reveal that the moisture retension decreased steeply at 0.3 to 1.3 bar and gradually upto 5 bars.

Ongoing Projects

Farm Economics and Extension

Studies on 'on farm irrigation water management' in the command of an irrigation minor of Chalakudy Irrigation Project

An 'Operational Research Project in water management' was implemented at Palissery in the Chalakudy command area. A compact area of 20.8 ha of rice fields belonging to 75 farmers was selected as the study area. A neighbouring block of equal area was selected as the control. Apart from the adoption of scientific crop and management practices, suitable cropping patterns were formulated and implemented in the different fields of the study area, based on the irrigation water availabilities.

While the grain yield of rice in the study area varied from 31.5 to 35.1 q/ha, it was only about 12.5q/ha in the control area. It was observed that the irrigation water consumption in the control area exceeded 300–600 mm than the study area without a corresponding increase in grain production. The water use efficiency varied from 2.11 to 2.85kg/ha/mm in the study area whereas it was as low as 0.75 kg/ha/mm in the control area. The study thus revealed the tremendous importance of scientific water management practices in maximising the efficiency of irrigation water use in rice production.

Cropping patterns and farming systems

Input requirement of rice based cropping patterns

With a view to identify the most economic rice based cropping pattern for the locality and to estimate the input reduction, in terms of fertiliser, that could be achieved by following different cropping patterns, an experiment with four cropping patterns and seven fertiliser levels was carried out at Chalakudy for the seventh consecutive year.

From the study, it was observed that depending upon the crop raised during the third crop season, the grain yield of rice varied significantly during the first crop season but not during the second crop season. The grain yield of rice succeeding dancha recorded the maximum grain yield during the first crop season followed by cowpea and they were significantly superior over the crops succeeding sesamum and follow. Though not significant, rice-rice dancha sequence recorded the highest yield during the second crop season.

With regard to fertilizer levels, even though the highest yield in rice was recorded when the recommended dose of fertiliser (90:45:45 kg NPK/ha) were applied it was comparable with the yield obtained by the application of 75% of the recommended dose of fertiliser.

The effect of different fertiliser levels on the grain yield of cowpea and sesamum and on the production of green matter by cowpea and daincha were not statistically significant.

Studies on rice based cropping patterns under constraints of irrigation water

Studies for the second consecutive year were conducted with five cropping patterns, (Two crops of rice followed by a third crop of rice, cowpea, groundnut, sesamum or bhindi) and two water management practices for rice during second crop season (7cm irrigation one and three days after the disappearance of ponded water) and three water management practices for different crops during the third crop season (7cm irrigation 1, 3 and 5 days after the disappearance of ponded water for rice and IW/CPE ratio of 0.3, 0.6, 0.9 and 1.2 for other crops) to identify an appropriate cropping pattern under constraints of irrigation water.

The period under report was the second year of study. The results showed that the different crop during the third crop season did not significantly influence the grain yield of first crop rice. The results also showed that during second crop season rice needs irrigation only days after the disppearance of ponded water. The results agree with that of the previous year. Unlike second crop rice irrigation for summer season rice can be delayed only for one day after the disappearance of ponded water for optium yield. Other crops in the sequence viz. bhindi, cowpea and groundnut needed frequent irrigation for higher yields whereas sesamum performed well under less frequent irrigation schedules.

VEGETABLES AND TUBER CROPS

Concluded Projects

Studies on the effect of irrigation and mulches on the growth and yield of amorphophallus and soil moisture conservation

The two year study was undertaken to evaluate the influence of irrigation and mulches on the growth and yield of amorphophallus during 1983-'94 and 1984-'85. The experiment consisted of four levels each of irrigation (Irrigation at 0.3, 0.6 and 0.9 I/WCPE ratio and no irrigation) and mulches (no mulch, coir dust, dried leaves and paddy waste) in a factorial combination.

The corm yield increased more or less linearly with increase in the level of irrigation. The maximum yield was recorded when the irrigation was scheduled at 0.9 IW CPE ratio and was significantly higher than the other levels of irrigation. Thus irrigation at 0.9 IW CPE ratio can be recommended for irrigated amorphophallus for better yield and higher water use efficiency, during summer season.

Among the mulching treatments, mulching with dried leaves recorded the highest corm yield which was significantly higher than other mulched and unmulched treatments. The results suggest that it is advisable to mulch amorphophallus with dried leaves for higher production of corms

Ongoing Projects

Scheduling irrigation to sweet potato in rice fallows with varying levels of nitrogen and potash

This was the second year of study which was previously conducted once during 1981-82. The study comprised of three water management practices (0.4, 0.8 and 1.2 IW/CPE ratios) and five fertiliser levels (no fertiliser and four combination of 50 and 75 kg each of N and K_2O per ha).

The results of the study indicated that sweet potato grown under irrigated condition in summer rice fallows needs irrigation (50 mm) at 1.2 IW CPE ratio (at about 10 days interval) and application of nitrogen and potash at the rate of 50 kg each per hectare for optimum yield.

COCONUT AND ARECANUT

Studies on the effect of irrigation schedules on the growth and yield of coconut

The experiment was started with a view to formulate a suitable irrigation schedule for coconut during summer season and comprised of five levels of irrigation (irrigation at 25 mm, 50 mm and 75 mm CPEs and once in three days and no irrigation). Since the experiment was conducted in adult bearing palms, the pre-treatment data on nut yield was collected during 1981-82 and irrigation treatments were applied during the three

summer seasons of 1982-83 to 1984-85. Due to the wide time gap between flower initiation and nut maturity in coconut, the full effect of the treatments would be exhibited from the third year onwards. However the initial three year data indicates some trends. The data on the aggregate yield of nuts for the first year did not show any indication of the influence of various irrigation schedules. During the second and third (upto reporting period) years of study, the effect of the irrigation treatments on nut yield could be observed. The irrigated treatments fared better in both the years. Irrigation once in three days and irrigation at 25 mm CPE recorded almost equal yields which was well higher than other irrigated treatments.

Highlights

RICE

Pre-emergent application of the weedicide Goal @ 0.24 kg ai/ha was found to be very effective in controlling all types of weeds in dry sown rice during first crop season.

The water management practice of 7 cm irrigation one day after the disappearance of ponded water was found to be as effective as the practice of continuous submergence of 5±2 cm with regard to the grain yield of dry sown rice during first crop season but was superior in water use efficiency.

Under conditions of water scarcity during second crop seaon, irrigation for rice need be scheduled only five days after the disappearance of ponded water especially in areas where the ground water table is shallow and evaporative demand is less.

Application of 70 kg N/ha is optimum for short duration rice varieties during second crop season under the water management practices of continuous submergence and 7 cm irrigation one, three and five days after the disappearance of ponded water.

FRUITS AND FLORICULTURE

Pineapple

It is recommended to irrigate at 0.6 IW/CPE ratio during summer seasons and to mulch the basins with dried leaves at the time of planting for higher fruit yield and better water use efficiency in pineapple.

PULSES AND OILSEEDS

Cowpea

Cowpea grown in rice fallows during summer season requires irrigation at 0.75 IW/CPE ratio (at about 15 days interval) or at critical stages (branching, flowering and pod formation) for increased yield.

Sesamum

Sesamum is to be irrigated at the four critical stages of 3–4 leaf stage, branching, flowering and pod formation or at 0.75 IW/CPE ratio to ensure higher grain yield during summer season. Nitrogen requirement of irrigated sesamum is 30 kg per ha.

Groundnut

Irrigation for groundnut during summer season is to be scheduled at 0.9 IW/CPE ratio (50 cm depth) for ensuring increased pod yield which requires about 8 irrigation and 400 mm of water. Irrigated groundnut requires phosphorus and potassium at the rate of 25 kg per ha.

Soils and Agronomy

The soil moisture retention characteristics of sixteen major soil series of Chalakudy irrigation command have been worked out at seven different depths viz. 0–15, 15-30, 30-45, 45-60, 60-90, 90-120 and 120-150 cm. The important physical properties of these soil samples were also worked out. It will serve as the basic data for scheduling irrigation to different crops of the command.

Farm Economics and Extension

The results of the 'Operational Research Project in water management' implemented at the Palissery area of Chalakudy command revealed the tremendous importance of 'on farm water management' coupled with scientific crop management in maximising the grain yield of rice and increasing irrigation water use efficiency.

Cropping patterns and Farming systems

Raising daincha and cowpea during the third crop season was found to be affective in increasing the grain yield of rice during the first crop season. Cowpea has the additional advantage of yielding in economic produce.

In cropping patterns of two crops of paddy followed by fallow or a third crop of cowpea, sesamum or daincha, rice crop (medium duration) raised during first and second crop seasons requires only seventy percent of the present recommended dosage of fertiliser of 90:45:45 kg NPK ha.

VEGETABLES AND TUBER CROPS

Amorphophallus

Irrigated amorphophallus requires irrigation at 0.9 IW/CPE ratio during summer season for increased production corms.

Mulching the ridges of irrigated amorphophallus with dried leaves, paddy waste and coir dust in the order of preference, is found to conserve soil moisture more efficiently decreasing the irrigation requirement of the crop but increasing yield

Sweet potato

Sweet potato grown under irrigated condition in summer rice fallows needs irrigation at 1.2 IW/CPE ratio (at about 10 days interval) and application of nitrogen and potash at the rate of 50 kg each per hectare for optimum yield.

1.15 RICE RESEARCH STATION, VYTTILA

Rice Research Station, Vyttila was started in the year 1958 in leased land in Kunnara area near power house, Vyttila. The station started functioning in the present site in 1963 by acquiring 4.60 ha of land. Subsequently in 1973 an additional area of 4.10 ha and during 81-82, 0.20 ha were also acquired thus making the total area to 8.90 ha. The utilization of the area is as follows:

Area used for rice cultivation	4.2500 hectares
Area used for fish ponds	3.0552 ,,
Dryland area used for coconut cultivation and buildings	1.6082 ,,

All India Co-ordinated Research Project on Brackishwater fish farming is functioning at this station from 1976. A unit of the scheme for project for investigation of coconut root (wilt) disease is also being implemented from 1981. This station is included under National Agricultural Research Project for special region.

The main objectives of the station are to evolve high yielding saline resistant rice varieties suited for the low lying coastal areas, to find out suitable agronomic practices for the cultivation in such type of lands in the state and to evolve culture practices for various types of fishes and prawns and to identify fish varieties suitable to culture in the paddy fields with and without rice and in the ponds and other water areas. Different projects under various disciplines such as Agronomy, Botany and Fisheries were in progress during the year under report.

Sri P. J. Tomy continued to be in charge of the station during the period.

The scheme of AICRP on Brackish water fish farming was terminated on 31-3-1985 and hence the staff, One Associate Professor, One Junior Assistant Professor, One Lab Assistant, One Driver, two Fishermen and a Watchman were relieved from this station with effect from 31-3-1985.

Monthly workshops ,under T & V programme for the District of Ernakulam were conducted in this station during the year under report. Three trainings were conducted for farmers under the Lab to Land and Village Adoption programmes.

Sri I. S. Bright Singh, Junior Assistant Professor attended the symposium on "Culture of Penaid prawns shrimps," held at Manila,

Philippines and presented a paper on Heterotropic Bacteria associated with Eggs and Larvae of Penaeus Indicus in a hatchery System from 4-12-1984 to 7-12-1984.

Sri T. U. George, Associate Professor, attended the zonal workshop conducted at Regional Agricultural Research Station, Kumarakom under NARP on 3rd and 4th April, 1984.

Sri T. U. George, Associate Professor, attended the State level Agricultural Seminar conducted at Alwaye in 8th June 1984 in connection with the Agricultural input fortnight.

Sri T. U. George, Associate Professor, attended the seminar on "KAU 2000 AD" conducted at Vellanikkara on 22nd 23rd and 24th November, 1984.

Sri T. U. George, Associate Professor attended the ICAR Review committee meeting under Lab to Land programme conducted at CIFT, Cochin on 15th January 1985.

Research

The total number of research projects as on 31-3-1985 was 18.

Other matters

The construction of the new laboratory building and a store under the NARP has been completed during the year under report.

Visitors to Departments/Station Scheme

The Director of works of ICAR visited the station with the Director of Physical Plant on 27th April 1984 to inspect the progress of construction works under NARP.

Ongoing Projects

RICE

Hybridisation programme - Improvement of Pokkali rice

The objective of the project is to evolve high yielding rice varieties suitable for Pokkali area by hybridisation. Cul. 4-4 evolved from the hybridisation between Pokkali x T (N) 1 has out yielded the present improved variety Vyttila in the comparative yield trials and in the district trials. Cul. 4-4 has the same duration (115 days from seed to seed) and same plant type of the Vyttila-1. In the yield trials, Cul. 4-4 gave 15 to 20% higher grain yield than Vyttila 1. The variety has been evaluated by the Variety Evaluation Committee and has been recommended to the State Seed Committee. The committee has approved the proposal to release Cul. 4-4 as Vyttila-3 suitable for cultivation in the Pokkali areas in the districts of Ernakulam and Alleppey.

Breeding for earliness in the variety Mahsoori by induced mutation

The objective of the project is to reduce the duration of the variety Mahsoori by using physical mutagens. The work was initiated in 1978 by treating seeds of the variety Mashoori with Gamma rays at different

doses. Six early cultures were selected and a preliminary yield trial was conducted during the year 1984-85 with these six cultures and Vyttila-1 and Mahsoori as control. The cultures were earlier than Mahsoori by 2 to 3 weeks and were having the duration of Vyttila-1. The 1000 grain weight in the cultures was very low ranging 18 to 20 gms while number of grains per panicle was very high. Further yield trials are to be conducted to get conclusive results.

Breeding high yielding rice varieties suitable for Pokkali area by hybridization

The objective of the project is to evolve high yielding rice varieties suitable for Pokkali area by hybridization between Pokkali varieties and IR-5. Along with high yield, other requirements fixed are the tall plant type, short duration and ability to withstand salinity, acidity and water logging. With these objectives, the programme was initiated during the year 1980 by crossing Vyttila 1, Vyttila-2 and Ponkuruka with IR-5. The selected cultures were having duration of 118 to 130 days and height from 120 to 180 cm. Further yield trials can be conducted with these cultures in the next cropping seasons.

Breeding for earliness in variety H-4 and SR 26-B by induced mutations

The objective of the project is to reduce the duration of the rice varieties-H4 and SR-26 B by using physical and chemical mutagens. It was found in the varietal trials conducted earlier that these varieties are suitable for cultivation in Pokkali area but for their long duration. Hence a mutation breeding programme was initiated during 1980 to reduce the duration in the variety H4. The seeds were treated with both physical (gamma rays) and chemical (Ethyl Methyl Sulphonate) mutagens. Twenty four promising cultures were selected from the M-5 generation on the basis of duration, height of the plant, number of productive tillers, number of grain per panicle etc. Further yield trials can be conducted with these cultures in the next cropping season.

Collection, maintenance and utilization of saline resistant rice varieties.

Thirty four saline resistant rice varieties were collected and maintained under the project. One variety—Ponkuruka—from this collection has already been used for a hybridization programme initiated in this station.

Crop Management

Evaluation of fertiliser response and production potential of promising saline tolerant cultures.

The objective is to study the fertiliser response and production potential of five saline tolerant cultures selected from the screening trials.

The varietal as well as fertiliser effects are to be significant. IR-5074 gave the highest yield which was on par with all other varieties except IR-5962. In the case of fertilisers, no fertiliser gave the highest yield which was on par with N 20, P 40. During the cropping season, immediately after fertiliser application, flooding occurred which might have vitiated the fertiliser treatments and so the fertiliser effects could not be considerable.

Effect of granular pesticides for control of rice pests, on fish in Pokkali field

The objective of the experiment is to evolve simple technology and safe chemicals for control of major pests in Pokkali rice namely stem borer, leaf roller and rice bug without harm for fish and prawns.

There was no significant difference in yield between treatments. However, higher yield was obtained in plot treated with carbofuran. There was also no significant difference in number of leaf-roller affected leaves and white ear heads between treatments.

No toxicity was noted on fish as counted by the number of fishes died due to insecticide treatment. It may be due to the higher water level in the field which might have diluted the concentration of insecticides.

COCONUT

Crop Management

Response of diseased and apparently healthy palms to fertiliser levels and organic manuring (in reclaimed soil types) (Ponnurunni, Vyttila, South Chittoor and Edayaltunnam)

The objectives are to study the response of diseased and apparently healthy palms to different fertiliser levels, to organic manuring under different fertiliser levels, and to study the occurrence and spread of disease in healthy palms under different fertiliser levels and organic manuring.

In the case of apparently healthy palms, a decreasing trend in disease intensity was noted from the pre-treatment value in all the treatments.

With regard to diseased palms the disease intensity showed a decreasing trend from the pre-treatment values in spectrum of treatments. An increase in the yield of nuts was noted.

Studies on the growth performance and disease tolerance of important coconut cultivars and hybrids under disease stress condition of Vyttila

The experiment consists of two hybrids and 9 cultivars. The hybrids are T x D, LO x G, D x T, T x YD and T x NGD and the cultivars WCT, LO, AO and CC.

The highest number of [illegible] was produced by [illegible] followed by [illegible] Highest number of [illegible] was produced by [illegible] followed by [illegible]

Seed resource survey of cultivable species of brackishwater fish and prawn in the Cochin backwaters

The objective of this project is to make an assessment of the qualitative and quantitative availability of the seeds of cultivable varieties of prawn and fish during different seasons in the Cochin backwaters. Monthly collection of samples from [illegible] showed that the availability of post larvae of prawn seed varied from 70 (October) to 7280 (May) per net per hour. The percentage of *Penaeus indicus* varied 3 to 40.5 in the shooting net collection. *Penaeus monodon* was found in limited quantities (1.5 to 2.5%) during [illegible]. The number of prawn juveniles fluctuated between 316 (October) and 1506 (June). The percentage of *P. indicus* among the juveniles ranged from 2.5 to 57 (November). The number of mullets seed per net per haul ranged between nil (March, July and August) to 162 (June). Thus it can be seen that seed of *P. indicus* is abundant in this area during March-May period whereas *P. monodon* is available in limited quantities during May-June period. Mullet seed is abundant during May-June.

Nursery rearing of prawns and fishes

The aim of the experiment is to find out the best nursery rearing practice suitable to the locally available species of prawns and fishes in order to obtain maximum survival rate during nursery rearing. One experiment on nursery rearing of *Chanos chanos* was conducted during the period under report. A pond having 0.15 ha area was prepared suitably by eradicating predatory and weed fishes by applying mahua oilcake @ 250 ppm lime, raw, cow dung and mussoriphos @ 1000 kg/ha, 3600 kg/ha/yr and 600 kg/ha/yr respectively were applied in the pond. *C. chanos* seed having 25 mm and 80 mg was stocked @ 30 000/ha. Feeding was done daily with powdered ground nut oil cake and rice bran in 1:1 ratio @ 5% of the body weight of the fish seed. After one month the fish fingerlings were harvested. The final average size was 4.5 gm and 85 gm with a servival of 65%. The experiment showed that *C. chanos* can be successfully reared to stockable size in well prepared ponds by providing supplementary feed.

Studies on mono and polyculture of fin fish and shell fish with and without supplementary feeding

The study envisages to find out the best species combinations in order to achieve maximum production and to formulate a cheap, nutritive supplementary feed readily acceptable to the prawns and fishes utilizing the locally avilable agricultural products.

During the period under report four experiments on biculture of prawn with fish and one monoculture of fish were completed. 2 sets of experiments on monoculture of fish with and without manuring are also in progress.

In the first experiment on biculture of *Penaeus indicus* and *Chanos chanos*, the stocking density was 10,000/ha and 200/ha respectively. A net profit of Rs. 4735/ha/year could be obtained from the experiment.

In the second experiment the stocking density and species were same as the previous one. The net profit based on the inputs alone worked out to Rs. 5508/ha/year.

In the third experiment stocking density and the reared species were same as the second one. The net profit worked out to Rs. 8128/ha/yr.

In the forth experiment *P. indicus* seed was stocked in pond after usual preparation and application of fertilisers. Later *C. chanos* was also stocked in the pond @ 500/ha. Regular feeding and manuring were done in the pond. The prawn in the experiment had grown from 12 mm and 5 mg size to 140 mm and 16 gm within a period of 100 days. The net profit from the experiment based on inputs alone worked out to Rs. 7848/ha/100 days.

For monoculture experiment fingerlings of *C. chanos* were stocked in a prepared pond @ 2000/ha. Manuring with raw, cow dung and mussoriphos @ 3600 kg/ha/12 doses and 600 kg/ha/12 doses were done. No supplementary feed was provided. After 12 months rearing the crop was harvested. A net production to the tune of 977.8 kg/ha/yr was obtained with a survival of 79%.

Two sets of monoculture experiment with *C. chanos* are in progress. The chanos fingerlings were stocked in the prepared ponds @ 4000/ha. Out of the four ponds, two are being manured with raw, cowdung and mussoriphos at the rates as mentioned in previous experiment. The other two ponds kept as control without manuring. The other management practices are identical in all the four ponds.

From the results of the biculture experiments it can be seen that the stocking density of 10000/ha for prawn is very low and this does not seem to influence the growth rate of prawn. The introduction of fish species into the prawn pond might have helped to control the algal bloom there by increasing the survival rate.

For monoculture stocking density of chanos @ 2000/ha seems to be very low in brackish water culture systems. More over the culture of a single species of fish is not suitable for achieving higher production.

Prawn culture in Pokkali fields after the harvest of paddy

The work is mainly intended to find out the ways and means to improve the prawn filteration practices by inducting scientific methods

of culture in Pokkali fields when rice is not grown here owing to the salt water ingress

Selective stocking of *Penaeus indicus* was taken up in paddy field having an area of 0.5 ha.

Traditional method of prawn culture was resorted in another field of 0.5 ha area. The comparison of both the systems shows a higher production rate for the traditional method. But this does not seem to be a conclusive proof due to the suspected escape of prawns and subsequent poor survival rate in the selective stocking field. More over the individual growth of prawn was also poor.

Polyculture of fresh and brackish water fishes in brackish water ponds

The aim of the experiment is to enhance the total fish production from brackish water pond by culturing fresh water and brackish water fishes during the low saline phase. From the experiment it is seen that during the monsoon season due to the influence of fresh water, the salinity remains very low in the interior brackish water areas. This condition can be suitably utilized for increasing fish production by culturing carps along with brackish water fishes.

Observational trials on fish culture in homestead ponds

The study is intended to find out the feasibility of fish culture in homestead ponds in the coastal belt of Kerala. It is also proposed to find out the suitable species of fishes that can be cultured in this type of ponds, taking into consideration of the physico-chemical and biological limitations.

The results of the experiment have shown that there is a great scope for fish culture in homestead ponds if suitable species of fishes are stocked.

Studies on the food preference and feeding habits of important brackish water fishes cultured in ponds

This work envisages to find out the food preference and feeding habits of important brackish water fishes cultured in ponds and also to see whether all the available niches are being properly utilized by these cultured species.

From the analysis it was found that the gut content mainly composed of algal filaments, blue green algae, synchococus, diatoms, copepods, cladocerans and crustacean nanplil. The plankton contained brackionus, cladocerans, copepods, nysids, green algae, blue green algae, and diatoms. Macrobenthos in these ponds are constituted by polychetes, amphipods and molluscs.

Studies on the ecology of brackish water ponds in relation to productivity

The objective of the study is to find out the optimum dosage of lime, manure, supplementary feed etc., required in each pond with a

view to achieve maximum production. For this, important physico-chemical parameters such as depth, temperature, pH, dissolved oxygen, salinity, alkalinity, primary productivity phytoplankton, zooplankton and benthos were studied during the period under report.

The primary productivity ranged from 0.15—10.97 mg/M^3/day and a remarkable relation could be seen between the productivity and the number of phytoplankton.

Highlights

Cul. 4–4 evolved by hybridization between Pokkali x T (N) 1 gave higher yield than the present improved varieties. It has the same duration (115 days) from seed to seed and has the same plant type of Vyttila-1. The grain size and cooking qualities are similar to Vyttila-1 and it has got higher protein content. The culture has been released as Vyttila-3 suitable for cultivation in the Pokkali areas in the district of Ernakulam and Alleppey.

During the low saline phase of brackish water ponds, if carps are cultured along with brackish water species, total fish production can be enhanced. The production obtained during 1984 (1463 kg/ha/4 months) when compared with that from the culture of brackish water species alone is almost double.

1.16 AROMATIC AND MEDICINAL PLANTS RESEARCH STATION, ODAKKALI

This station is working under the Kerala Agricultural University since 1972.

The objective of the station is to conduct investigations on the agronomic, botanic and post-harvest and biochemical aspects of aromatic and medicinal plants in order to develop the cultivation of these groups of plants in the State.

Total area of the station is 12.4 ha.

Crop coverage

Lemongrass	:	5.90 ha
Palmarosa	:	2.45 ha
Coconut	:	1.25 ha Planted on road sides and block sides
Cashew	:	0.40 ha
Lemongrass germplasm	:	0.40 ha
Catharanthus roseus	:	0.20 ha
Banana	:	0.10 ha
Other crops such as Dioscorea, Colocasia, Pineapple, Pepper, Solanum and other medicinal plants	:	0.60 ha
Total	:	11.30 ha

and the rest 1.10 ha are roads and buildings.

Sri. E V G Nair was in charge of the station during the year

A Krishi Darshan Programme was orgsnised on 31 12 84 in which farmers nearby the station were given class on crops of the station.

The one month training programme for the tribals conducted at Attappady were attended by Sri E V G Nair, Associate Professor and Sri K P Kunhkose, Junior Assistant Professor

Smt K K Santhakumari Amma, Graduate Lab Assistant had attended a five days training programme at Regional Research Laboratory, Trivandrum from 2 7 84 to 6 7-84

Number of research projects as on 31-3 85 was 10

Research Highlights

The trial on lemongrass varieties in the representative sandy tract at Alleppey revealed that variety OD-19 can be cultivated as a commercial crop in that area which is not tried so far.

Dioscorea floribunda the exotic Steroid plant can be grown as a two year crop under Kerala condition for getting optimum tuber yield

Concluded Projects

Crop Management

Weedicide trial on Palmarosa

The experiment was done for three years with three weedicides, viz. Propanil, 2 4-D and Tok E.25 along with hand weeding and control (unweeded). The weedicides were applied at two doses, viz. 1 kg ai/ha and 1.5 kg ai/ha.

The results for the three years showed that maximum grass and oil were produced in the plots where handweeding was adopted, than in the weedicide applied plots.

Ongoing Projects

Evaluation trial on Solanum viarum

It was a multilocational trial of ICAR to evaluate four improved varieties of *Solanum viarum*. It was the 2nd year of the project.

The result of the trial showed that the variety Glaxo is having the maximum dry berry yield per ha (244.4 kg/ha).

Selections of elated plants of Palmarosa from bulk crop

Fourteen selections were made from the bulk crop of Palmarosa grown at this station and they are under evaluation. One type is appeared to be high yielding with respect to oil. The plants will be evaluated for another one year for grass and oil yield and chemical content before making final selection.

Studies on the performance of selections of Solanum viarum (Observational trial)

In order to develop a spineless variety of *Solanum viarum* selections were made from the bulk crop of Solanum at this station based on low spine count. The selected 54 types were selfed to produce S_1 generation in which further selections were made.

The selections made showed that 18 spineless plants were obtained in S_1 generation and these were brought forward for raising S_2 generation.

Crop Management

Influence of N levels on a 2 year crop of Dioscorea floribunda

A 2 year crop was raised with treatments of 4 levels of N and uniform P and K. The crop was harvested after 2 years. The data showed that fresh weight of tubers was maximum with the application of 125 kg N/ha in two year period

Influence of stage of harvest on higher yield and good quality oil of Palmarosa (coninuation of Ph. D. thesis)

The crop was harvested at 5 intervals starting from 50th day to 90th day at 10 days interval Data showed that maximum grass yield was obtained by harvesting at 70-75 days interval but oil yield at 90-95 days interval

Since two years data are already available (part of thesis work of a Ph D student) the trial will be concluded and the pooled analysis will be done to draw the result

Studies on the changes taking place in the physical and chemical properties of lemongrass oil during prolonged storage

Lemongrass oil produced at three different centres viz. Odakkali, Pampadumpara and Mannuthy were stored in containers and analysed for its physico-chemical properties at monthly intervals The oil is to be stored for five years

This is the 4th year of the project The citral content in the oil produced and collected from three different centres showed decreasing trend on long storage

Other matters

Participated in the Educational District Science Fair held at Kuruppampady

Conducted a Kisan Mela and Farmers training on 21-1-85

Special scheme

In order to find out whether lemongrass can be grown in sandy tract of Alleppey District, a replicated trial with three varieties of lemongrass was laid out during the year in the estates of Kerala State Drugs &

Pharmaceuticals, Alleppey as per their request with the sanction of the University (KSDP w.e.f. 150 M. T. of lemongrass oil annually for manufacturing Vitamin A and they are not getting even half of their requirement). The data obtained on the quantity and quality of the oil revealed that lemongrass can be cultivated successfully in the sandy tract. The trial will be continued for another one year.

Visitors

Several farmers and field workers/scientists visited the station.

1.17 CARDAMOM RESEARCH STATION, PAMPADUMPARA

The Cardamom Research Station, Pampadumpara was started in the year 1956 with a view to undertake research programme on various agronomical, botanical, entomological and Phytopathological problems of Cardamom cultivation. The Station is located in the high ranges of Kerala in the Pampadumpara Village, Udumbanchola Taluk of the Idukki District, 35 km from Kumily, on the Kumily-Munnar road. The All India Co-ordinated Spices and Cashew nut Improvement Project of ICAR was initiated at the station during 1972.

The total area of the farm is 46.44 ha. The crop coverage is given below:

Cardamom	:	37 ha
Pepper	:	2 ha
Coffee	:	5 ha
Buildings and roads	:	2.44 ha

Dr. P. Karunakaran, Associate Professor (Plant Pathology) continued to be incharge of station.

Sri G. K. Balachandran Nair, Associate Professor (Agronomy) and Sri K. Vasanthakumar, Assistant Professor (Hort) were granted half pay leave for study purpose upto 15th May, 1984 and 22nd April, 1984 respectively.

The scientists participated in the monthly workshop under the T&V Programme of Idukki District as Chairman and Resource Personnel.

Sri P. G. Sadhankumar, Jr. Assistant Professor attended the Training programme in Audio Visual Aids conducted at the Directorate of Extension, Mannuthy.

Extension lectures were conducted under Lab to Land programme, T & V programme and in Seminars organised by the Kerala Agricultural University and Department of Agriculture.

Concluded Projects

Evaluation of Agrozim 50 WDP (Carbendazim) against the Clump rot and Azhukal diseases of Cardamom

Summary of work done

A trial was laid out during 1984-85 in a private estate where the disease of clump rot and Azhukal was noticed.

Evaluation of Coroban 20% EC against Cardamom thrips

Summary of work done:

A trial was laid out during 1984–85 to find out the relative efficacy of Coroban 20% EC against Cardamom thrips

Ongoing Projects

Crop Improvement

Germplasm collection

Among the types maintained, PV-1 was found to be the most promising type, followed by PV-4. The lowest yielder was Pink Cardamom. It is proposed to collect and add different promising types as well as wild relatives from different Research Stations for studying their performance and making use of them in crop improvement work.

It is also proposed to collect promising types from the estates in Idukki District and from Nelliampathy.

Hybridisation in Cardamom

A planned hybridisation programme with selected Vazhukka types against the improved selections viz., PV 1 (Malabar) and PR-107 (Mysore) were done during 1982-83. Seeds were collected and sown in nursery. During 1983-84 they were planted in the Secondary nursery. They will be planted in the main field during this year.

Trends observed

Capsule setting was observed in both cases. Seeds were viable

Irradiation of Cardamom Seeds

During 1983, seeds of Malabar, Mysore, Vazhukka and PV1 were irradiated at doses 0.5 Kr, 1 Kr, 2 kr and 4 Kr. Seeds were sown in the glass house. During 1984, they were transplanted in the Secondary nursery and nurtured well.

The irradiated seeds showed a high germination percentage. They will be studied for their yield and drought tolerance. The trial will be laid out in July, 1985.

Selection of high yielding Cardamom plants from the existing plant population of the Station

1000 superior plants from the farm were selected. Based on their yield performance 150 plants (50 each under Malabar, Mysore and Vazhukka) were selected and planted in a block.

Observations were taken on tillering ability, panicle production and fruit yield.

150 plants selected will be observed for their yield performance and further screening will be done.

Studies on the unprecedented drought that occurred during 1983 on crop growth of Cardamom

30 coal plots were selected at 3 places during 1983. Each was divided into three viz., upper, lower, and middle (with reference to elevation of the slope). 10 plants were selected from each sub plot. Biometric observations of these plants were recorded.

Studies on the genetic potential of drought tolerant plants

The survived plants from worst affected plots (due to drought that occured during 1983) were selected. Their biometric observations were recorded. They were planted in a composite area during 1984. They will be studied for their drought tolerance and yielding ability.

Field survival plant, growth and productivity in Cardamom as influenced by the number of secondary nursery seedling suckers

An observational trial was laid out during July, 1983 with 8 treatments viz., Secondary Nursery seedlings having 1, 2, 3, 4, 5, 6, 7 and 8 suckers (Single plant treatment). Observations were recorded on survival percentage, number of tillers, No of panicles and yield.

The above observations were taken for 1983, 1984 and 1985. From the observations so far recorded, survival percentage was higher for planting material having 2 suckers and above.

Irradiation trial to screen Cardamom plants resistant to Katte disease

A new set of irradiation trial was taken up during January, 1985 with a view to screen Cardamom plants resistant to Katte disease. The seeds of Malabar, Mysore and Vazhukka were subjected to γ-radiation at doses 5 Kr, 10 Kr, 15 Kr, 20 Kr and 25 Kr. The seeds were sown in the glass house.

Trends observed

The irradiated seeds germinated early when compared to control.

The germination percentage was higher for irradiated seeds upto 15 Kr.

The rate of growth was higher for irradiated seeds.

The seedlings will be inoculated with viruliferous aphids @ 15 aphids/seedlings. Then they will be observed for symptom development and susceptible ones will be removed.

Inoculation and screening of resistant plants will be repeated.

Crop Management

N P K fertilizers experiment

The 3^3 NPK fertilizer experiment was laid out during 1984 and observations are being recorded.

Under the niform shade with coir mesh matting, the growth of plants are found to be uniform and encouraging.

Plant Protection

PLANT PATHOLOGY

Testing line of Cardamom for disease resistance

As decided in the workshop on spices held at Calicut, the technical programme of project was revised and the same is being implemented from 1984-85. Sufficient number of seedlings were raised in the glass-house. The first inoculation of the seedlings were conducted at the third leaf stage @ 5-10 aphids/seedlings, by opening the tender leaves.

Second and third inoculations with viruliferous aphids were conducted at intervals of 30 to 45 days. Observations on symptom development were recorded. Symptoms were developed on susceptible seedlings from 28-45 days of inoculation.

Katte disease symptoms were observed on susceptible seedlings of all the three popular varieties viz., Malabar, Mysore and Vazhukka from 28-45 days of inoculation when inoculated with viruliferous aphids @ 5-10 aphids/seedlings. The percentage of infection was found to be higher in the 1st inoculation, when the seedling was at the third leaf stage and decreased in the second and third inoculations.

Future lines suggested:

During 1985-86, it is proposed to continue the inoculation studies with viruliferous aphids @ 15 aphids/seedlings. After the IV inoculation, resistant seedlings will be transplanted in pots. The characters of the resistant plants will be studied in detail to know the basis of resistance.

Etiological studies on clump rot Azhukal disease of cardamom

The project was started during the year 1984-85 with a view to study the disease syndromes of Azhukal and clump rot disease by artificial inoculations to prove etiology. Three popular varieties of Cardamom viz., Malabar, Mysore and Vazhukka were grown in pots and inoculation studies were conducted with *Pythium* and *Phytophthora* individually and in combinations. Inoculation studies were conducted on plants grown in the field. The inoculation studies were conducted on the pseudostem, root, capsules, panicles and younger leaves.

Visible symptoms of Azhukal disease was noticed on younger leaves and capsules when inoculated with *Phytophthora* individually and in combination with *Pythium*. No visible symptom could be reproduced on the pseudostem, root and panicle when inoculated with *Phytophthora* and *Pythium* individually and in combination.

Symptoms of clump rot could not be artificially produced When inoculated with *Pythium* and *Phytophthora* individually and in combination.

Evaluation of fungicides against phytophthora sp causing Azhukal disease

Summary of work done A trial was laid out in a private estate where the intensity of Azhukal disease is maximum to evaluate the efficacy of the different fungicides

Epidemiology of Azhukal disease of Cardamom

Fifty plants in the host block at the Experimental Plantation, Pampadumpara, Udumbanchola, Santhanpara and Kallar Valley were selected during the year 1984-85 for recording disease incidence. Observations on the inoculum potential of *Phytophthora* prepupae on the soil, plant debris and collateral hosts will be recorded during the year 1985-86 Seasons when the disease is observed

ENTOMOLOGY

Trials to test the efficacy of different chemicals

Observational trial with Dursban (Chlorpyrifos) against Cardamom thrips

Highlights

The result of comparative study of five promising selections of Cardamom revealed that PV, (A Malabar type) recorded the highest yield of 395 g of dry capsule per plant.

It was seen that irradiation enhances germination percentage in Cardamom upto a dose of 15Kr. (53.21 to 71.66 %). The irradiated seeds germinated early when compared to control. The rate of growth of irradiated seeds was high when compared to control

From the adaptive trials conducted it was found that Azhukal disease of Cardamom can be effectively controlled by foliar application 1% Bordeaux mixture @ 1-2 litres/plant with adhesive and soil drenching with 1% Bordeaux mixture @ 2-3 litres/plant during the months of July, August and September-October.

The phosphatic synthetic pyrethroids, permethrin and cypermethrin were evaluated against Cardamom thrips. It was found that Permethrin at 100 ppm was on par with Cypermethrin 60 ppm and Monocrotophos 300 ppm for the control of Cardamom thrips.

Other matters

Participated in the Scientific Exhibition held at the Government High School, Nedumkandom from 19-11-84 to 21-11-84 and exhibited different aspects of Cardamom cultivation.

A field day was conducted at this Station on 29-3-1985 under the Lab to Land programme. An Exhibition was arranged on that day at this Station.

Conducted an Agricultural Seminar under the Lab to Land Programme during March, 1985.

Visitors

Dr. B. Choudhari, Head of the division of Vegetable, IARI. New Delhi visited the Station on 2-1-1985 to explore the possibilities of starting a research project on vegetables crops in the high range region under All India Co-ordinated Project.

1.18 REGIONAL AGRICULTURAL RESEARCH STATION, KUMARAKOM

The Coconut Research Station established in 1947 by the Indian Central Coconut Committee was taken over by the State Department of Agriculture in 1958. From 1972 onwards the Station is functioning as a constituent centre for research under the Kerala Agricultural University. During 1980-81, a scheme for investigation on the malady of root (wilt) disease of coconut palms was commenced at this station. The station was upgraded and reorganised under the National Agricultural Research Project (NARP) as a Regional Agricultural Research Station for the Regions of Problem zones of Kerala in 1982 with Rice Research Station, Moncompu, Rice Research Station, Kayamkulam, Rice Research Station, Vyttila and the Kole region Research Unit at Agricultural Research Station, Mannuthy as sub stations.

The area of this farm was originally 23.23 ha. An additional area of 21.68 ha of wet land was taken over by the University from the Department of Agriculture in July 1980 making the total area of the station to 44.91 ha out of which about 18 ha are channels and water ways. The uplands are occupied by coconuts, banana and cocoa. The low lands are under paddy. Water channels are utilized for fish farming.

The main objective of this station was originally to conduct research on coconut and coconut based farming systems with special reference to coconut root (wilt) disease. An integrated research project on mixed farming of coconut, livestock and fish culture underlying the principle of organic recycling is the mandate of this station. Consequent on the implementation of the NARP, the broad objective of the station is to conduct problem oriented location specific research on all crops in the problem region of Kerala.

Sri U. Mohamed Haneefa, Professor of Agronomy continued to be in charge of the station, the root (wilt) scheme, NARP and other schemes attached to the station during the period under report.

Smt Lila Mathew, Asst. Professor (Hort) was granted study leave for undergoing Ph. D. during the period under report.

Sri Saifuddin, Asst. Professor (Agrl. Chemistry) continued to be on study leave during the period.

Sri U Mohamed Kunju, Dr James Mathew, Sri D Joseph, Kavitha K Mydin, Sri Abraham Varghese, Dr P Sivaprasad and Sri K A Iman attended the Plantosym VI of the Rubber Research Institute, Kottayam from 16-20th December 1984

Sri G Mathai and Dr P Sivaprasad presented research papers in the Plantosym VI

Two NARP/KAEP workshops for the problem areas were conducted at this Station on 3-4-1984 and 6-3-85 for identifying field problems of Agriculture, Alleppey and Block Level Officers were given training course on Rice Production Technology for a week under the Lab to Land programme. Two batches of progressive farmers around the station were invited to the station and shown the different farms of the station as a part of the Krishi Darshan programme

Dr. A Vijayaraghavan, Assoc. Prof. (Ent), College of Agriculture has given a special lecture on the topic on the residue problems on food crops in the T & V Monthly workshop of Kayamkulam

Total number of research projects as on 31-3-85 was 52

Research Highlights

CO-ORDINATION GROUP-I

Coconut - Crop Management

Effect of SAMPPI-3 on the yield and disease intensity of root (wilt) affected palms (Observational trial)

An observational trial with SAMPPI-3 (a macro/micronutrient formulation) was laid out in the station with two doses of application of 3 and 6 ml in 3 l of water palm spray. The results of the trial for 2 years show that the treatment with 3 ml SAMPPI-3 in 3 l of water palm 4 times spray showed an yield increase of 19.28% over the pre-treatment yield. Regarding the root (wilt) disease the treated palms showed a marked decrease in D. I. Definite conclusion can only be drawn after conducting replicated experiments.

Trial cultivation of Banana as an intercrop in coconut garden

In order to select a suitable variety of Banana for intercropping in coconut garden and to study the effect of ratooning on the yield a trial was laid out with palayankodan, padathy, monthan and nendran. Three systems of planting viz. retaining 1 sucker, 2 suckers and 3 suckers per hill for ratooning were also tested. The study revealed that palayankodan with 3 suckers per hill was found to be the best remunerative system (56.5%) increase over palayankodan with 1 sucker/hill in the 2nd ratoon crop.

Response of apparently healthy and diseased palms to fertiliser levels and organic manuring

An experiment was laid out with different fertiliser and organic manuring with farmers practice as control was laid out to study the response, occurrence and spread of disease in healthy palms. At present no definite conclusion can be drawn as the experiment is in progress.

Effect of micronutrients on the yield and disease intensity of root (wilt) affected palms

An experiment was laid out to standardize the micro-nutrient requirements of diseased palms in relation to yield and disease intensity. The experiment is in progress. No definite conclusion can be drawn at this stage.

Effect of Boron on leafrot disease of coconut in palm which are affected by root (wilt) and leaf rot

An experiment was laid out with application of Borax in 4 different methods (Root feeding-crown pouring, Foliar and soil) was initiated in 1981. During the period the palms were indexed for disease intensity. Soil and leaf samples were analysed and yield of nuts were recorded. No definite conclusions can be drawn at this stage.

Effect of selected chemicals on the intensity of root (wilt) disease.

In order to screen the effect of chemicals like Ascorbic acid, Sodium bicarbonate, IAA, NAA, GA, Kinetin, EDTA, Pot. permanganate and phenolic compounds on the intensity of root (wilt) disease a study was initiated in 1983. During the period, indexing of the experimental palms were carried out twice and yield of nuts recorded. No definite conclusion can be drawn at present. But there was a decreasing trend of D. I in palms treated with NAA 100 ppm/2L/palm Pot. permanganate 1000 ppm/2L/palm and phenolics 200 ppm/2L/palm. The experiment is in progress.

Observational trial on stem injection with Borax

An observational trial was initiated in order to assess whether leaf rot disease of coconut can be controlled by the injection of borax.

In this experiment Borax 1% solution 100 ml per palm was injected to coconut at quarterly interval. The experiment was started only in May 1984. Experimental palms were indexed in Oct '84 which showed an increase in D. I both in the treated and control palms when compared to pre-treatment D. I. values done in Feb. '84.

Root studies of apparently healthy and diseased palms

In order to study the pattern of growth and rejuvenation of roots in healthy and diseased palms the trial was started. The indication are that in respect of apparently healthy and diseased palms the defective roots are found to be higher than that of healthy root.

Weed control in coconut garden of the reclaimed alluvial soils of Kuttanad

A study was initiated to survey the weed flora of coconut gardens of reclaimed alluvial soils of Kuttanad and to note their seasonal abundance, to find out the most economic method of weed control to compare the different methods of control, the effect of the treatments on yield of coconut palms

Crop protection

Studies on the varietal resistance of selected hybrids to pests and diseases

An experiment to assess the varietal resistance of selected hybrid of coconut like GB x SRM, CDO x LO, CDG x Phil, CDG x LO, CDG x SRM, GB x WCT, GB x LO, CDG x Phil, GB x LO, CDG x Phil MDY x Phil to pests and diseases was continued at the station. Preliminary indication are that the hybrids MDY x Phil, GB x SRM and CDG x Phil were most susceptible to the Red palm weevil and CDG x LO and GB x WCT, were tolerant to the weevil attack

Control of Red palm weevil (Rhyncophorus ferrugineus) using stem injection technique

A study to evaluate the relative efficacy of systemic insecticide applied as stem injection in the control of red palm weevil. The insecticides used were monocrotophos, dicrotophos, phosphamidon, dimethoate, methyl demeton, control and 1% carbaryl through crown, 100 ml Nuvacron was applied to the plant through stem injection method was found to kill all the grubs present in the palm. Residue analysis is in progress.

Evaluation of different attractants for the red palm weevil

An experiment to evaluate the relative efficacy of different attractants like coconut stem splits, sugarcane shreads, fermented cocoa pulp, pineapple waste, sugarcane molasses, fermented toddy and their combinations was initiated at this station. The maximum number of weevils were attracted by coconut stem splits with fermented cocoa pulp. The experiment is in progress.

Control of red palm weevil Rhyncophorus ferrugineus using microbial pathogen

In order to collect information on the microbial pathogen associated with red palm weevil and to test the possibility of the promising pathogen in the control of the pest a study was begun.

A bacterial pathogen was isolated from the pest and the pathogenicity established. The culture is to be sent to CMA for identification of the pathogen.

Control of rodents infesting coconut gardens

A project to evolve suitable methods of control against the rodents attacking coconut palms and nuts was begun at this station. In this project attempts were made to evaluate the different types of rat–traps like Bow trap, Moncompu trap, Kumarakom type and the common rat trap.

The results so far indicated that the Kumarakom type trap trapped the maximum number of rats. The different poison baits were also evaluated for their comparative efficacy in controlling rats.

Stem injection of systemic insecticides for the control of insect pests associated with root (wilt) disease infested coconut palms

An experiment to evaluate the efficacy of systemic insecticides applied as stem injections in controlling the pest complex of coconut and to study the impact of pest control on the general conditions of the root (wilt) disease infected palms was laid out in 1983.

Half yearly injections @ 7 ml ai/palm each of monocrotophos, phosphamidon and methyl demeton were given. Indexing of disease intensity also was done at half yearly intervals. The population of sucking insects was very low on the treated palms. There was no significant effect of the treatments on the disease scores of the treated palm. Instruments for the analysis of the residues are being procured.

Studies on the arthropod fauna in the rhizosphere of palms

The study was aimed at collecting and identifying the arthropod fauna associated with the rhizosphere of diseased and healthy palms. Study of the bioecology and feeding habits of the phytophagous species occurring on the root system will help to elucidate the precise role of the organism in the disease initiation in the palms.

The micro arthropods collected consisted mainly of collembola and acarids. The specimens have been sorted, counted and their number recorded. Samples have been sent to the Institute of Agrl. Sciences, BHU, Varanasi and University of Agrl. Sciences, Bangalore for identification. The experiments are in progress.

Effect of intercropping on the population of arthropod fauna in relation to the rhizosphere of coconut palms

The experiment aims to evaluate the effect of intercropping with fodder grasses and leguminous crops on the population of arthropods associated with coconut root system.

During the period 536 soil samples were drawn from the four trial plots located at Kanakkari, Peroor, Pathamuttam and Kurichy at monthly intervals. The soil samples were assessed and the soil fauna extracted consists mainly of collembola, and mites. The specimens have been sorted and measured. Samples have been sent for identification. The experiment is in progress.

Nature and intensity of damage caused by the mealy bug Pseudococcus Spp and their control

The project is aimed at studying the value and intensity of damage caused by the mealy bugs *Pseudococcus* spp and to work out effective methods of control of these pests.

The feeding by the pests resulted in scorching of the leaflets of newly opened leaves to varying degrees. Since the population of the pest was very low during the season control trial could not be taken up this season. In the last season a control trial with these insecticides was laid out. The results showed that Quinalphos (0.05%), Carbaryl (0.2%) and Phosalone (0.07%) were effective in controlling the pest.

Disease resistance trial on coconut

A project to test the resistance/tolerance of coconut hybrids varieties and cultivars against root (wilt) disease was initiated in the station. Hybrids T x LD, AO x LD, LO x LD, Java x LD, NG x LD, LD x T, LO x G x LD were included in the experiment. The experiment is in progress. Observation on the D.I of root wilt and yield are recorded.

Studies on the collateral hosts of the root (wilt) pathogen

This study was initiated to locate the collateral hosts of the root (wilt) pathogen in the diseased tracts.

Twenty two locations in Quilon, Kottayam and Ernakulam districts were surveyed. A total of 97 herbaceous plants covering different family and genera were observed and details recorded. This work is in progress.

Efficacy of pouring Bordeaux mixture against spraying

This observational trial was initiated to test feasibility of pouring Bordeaux mixture in the crown of coconut palms instead of spraying.

The results indicated that drenching the crown of the palms with 2% Bordeaux mixture was effective in reducing the leaf rot intensity when compared to spraying with 1% B. M. The economics of spraying and drenching also was computed and compared and it was found that drenching is cheaper than spraying.

The experiment is proposed to be repeated for confirming the findings.

Chemotherapy of root (wilt) disease with antibiotics

In this project the use of tetracycline group of antibiotics as a diagnostic test for the presence of MLos in coconut palms infected with root (wilt) disease.

Observations of the D. I. of root (wilt) was recorded. There is a general reduction in the intensity of root (wilt) disease in treated plots including the control plots as well except that in penicillin treated plots. The data has to be analysed for drawing conclusions.

Control of leaf rot disease by newer fungicide

This study is a multilocational attempt in which the station is one of the location. In this study attempt is made to control leaf rot using newer systemic and nonsystemic fungicides. Two sets of treatments are done on diseased palms (curative action) and another set on healthy palms (prophylatic action).

The fungicides used here are Panolil, Hinosan, Kitazin, Manzeb, Foltaf and Bordeaux mixture. The indication is that all the chemicals have curative action and none have prophylatic action. Among the fungicides manzeb 0.2% gave the maximum disease control. The yield data also follow the same trend. Definite conclusions can only be drawn after analysing the whole data from the different locations.

Predisposing factors macro and microclimatic conditions and atmospheric spore load of the leaf rot pathogen in relation to incidence of leaf root

This experiment was started with the objective of assessing macro and microclimatic factors congenial for infection and development of the disease, to determine the maximum spore load of the pathogen in relation to disease incidence and to locate the position and type of tissue where the infection actually occurs.

Since the spore trap was defective it was got repaired at the instrumentation centre at the College of Horticulture, Vellanikkara. So work could not be done in this experiment as the spore trap itself is the key equipment required for the studies.

Observational trial on Midwhirl Yellowing of coconut

This trial was begun to test the effect of minor elements like Ca, Mg, Zn etc. on the Midwhirl Yellowing of coconut. The treatment was applied to only one palm as that was the only palm showing the syndrome. The observations so far reveal that the disease was progressing in spite of the treatments. The trial is in progress. No conclusions can be drawn now as the trial period is only smaller.

Population dynamics of soil microflora of acid saline rice soils of problem area

The work could not be taken up as some of the chemicals required for the work had to be procured.

Studies on VV Mycorrhizal association in tuber crops

The study was initiated to survey the occurence of VA mycorrhizal association in tuber crops of Kerala. Over and above the response of

tapioca and sweet potato to inoculations of VA mycorrhiza and to stand ardise the mycorrhizal inoculation. The first part of the study is completed Mycorrhizal association were found positive for Tapioca, sweet potato *Dioscorea alata D esculenta*, *Colocasia esculenta*, *Coleus* sp.

Development of rhizobial inoculant suited to problem soils

This study is to assess the effectiveness of the native cowpea rhizobia of problem soils for isolation and identification of suitable strains of cowpea rhizobia for problem soils and for commercial production and distribution of efficient culture of rhizobia

Twenty pure cultures of rhizobia from different location were established. Rhizobia *Crotalaria juncea* & *Sesbania aculata* were also isolated. Field experiments with cowpea and groundnut to study the response of Rhizobia inoculation are in progress

Rice

Screening short duration rice cultures during puncha season at Kuttanad

The experiment is aimed at testing the performance of very short duration rice culture in Kuttanad.

Nineteen short duration cultures were tested with Annapurna as check variety. Culture 47-41-23 gave the highest grain yield.

Evaluation of indigenous materials for correcting soil acidity in rice cultivation

In order to study the comparative effect of indigenous materials like lime and common salt in correcting soil acidity to rice crop. There were four treatments with one treatment of lime and two doses of common salt with control.

Application of common salt @ 200 kg ha as basal give the maximum yield followed by the lime application. There was no deleterious effects on the crop due to application of common salt.

PULSES AND OILSEEDS

Cowpea

Varietal evaluation of grain type cowpea under partially shaded conditions in coconut garden

A trial was laid out to identify the best grain type of cowpea as an intercrop under partially shaded condition in coconut gardens. The initial evaluation trial was carried out with 21 varieties and 14 numbers have been selected for the CYT. The works are in progress.

Evaluation of vegetable cowpea for intercropping in the coconut garden of Kuttanad

An experiment was laid out with 34 varieties of vegetable type cowpea to select a high yielding type suited for intercropping in coconut gardens of Kuttanad and also to locate donor parents for breeding programmes.

The variety Manjeri Red Plain recorded the highest yield of 8.27 tonnes/ha. This will be taken in a CYT before finally deriving conclusions.

Evaluation of Red gram varieties for local adaptability

An observational trial was laid out to evaluate the suitability of growing Red gram as an intercrop in the coconut gardens of Kuttanad.

Nine varieties of Red gram were tested and the indications of the study is that Red gram comes up well in the Kuttanad soils. The crop takes a very long time to mature under the conditions. The variety IC 45762 performed best with an yield of 5033.3 kg/ha. The trial will be repeated.

Groundnut

Gamma radiation studies in groundnut variety TMV-2

A project was initiated to study the effect of gamma radiation in the M1 generation of groundnut variety TMV-2 and also to isolate desirable types with high yield.

Forty one lines were isolated and selected in M4 stage and based on the overall performance 12 lines were finally selected for multiplication.

Selection of suitable varieties of Groundnut for low lying areas of Kuttanad

In order to study the comparative performance and adaptability of different groundnut varieties suitable for the partially shaded conditions in coconut gardens of the low lying tracts of Kuttanad an observational trial was laid out with 20 varieties at this station in May 1984. The yield data showed that the variety GA-163-1 recorded the highest yield of 426 kg/ha followed by the variety Ah-56-1 yielding 416 kg/ha. A detailed study with 81 varieties are proposed to be initiated during the next season

Effect of date of sowing in germination, flowering podset and pod yield of groundnut variety TMV-2

An experiment was commenced in August 1983 to study the effect of different sowing dates on the total performance of the crop in Kuttanad and to identify the most ideal sowing time for the crop.

Out of the 5 sowing times (August, September, October, November and December) sowing done in August seems to perform well compared to others. The experiment is in progress.

VEGETABLES AND TUBER CROPS

Sweet potato

Shade tolerance studies in sweet potato

The experiment was conducted in order to study the performance of different cultures of sweet potato under partially shaded conditions in coconut gardens of Kuttanad and to identify the best shade tolerant culture of sweet potato for intercropping in coconut gardens. The data showed that Cul. 2421 to be the best for tuber yield followed by Cul. 4021.

Tapioca

Performance of short duration tapioca varieties

A study was undertaken to test the performance of short duration tapioca varieties to select the best suited one for the cropping pattern of the locality. Among the five local cultures Ambakkadan was found to be the best yielder (29.96 t/ha) followed by Ramanthala (22.77 t/ha). Ambakkadan excelled in cooking quality test as well.

FISHERIES

Experimental culture of common carp and giant fresh water prawn in cages

The trial was initiated to investigate the feasibility of intensive culture of common carp and giant fresh water prawn by rearing in cages with artificial feeding in Kuttanad conditions. The indications are that under the prevailing conditions and in the existing water bodies in the station the experiment does not seem feasible. Studies on air-breathing species can be tried under the conditions.

Culture of giant fresh water prawn macrobrachium rosenbergii

An experiment to study the economic feasibility of the culture of freshwater prawn in the channels of coconut gardens and to evolve a culture technique suitable to the North Kuttanad area. The experiment is in progress.

Assessment of the productivity and ecology of fish ponds channels and open waters in and around the RARS Kumarakom

The experiment was started to study the fish production potntial flora and fauna and changes in the physico chemical conditions of the cultivable waters of the station. The surface water temperature varied from 28°C to 34.5° whereas the air temperature ranged from 30°–34°C during Jan. 1985. The pH in the reservoir was constantly on the acid side and ranged from 5.5 to 9.0. Salinity ranged from 0.18 to 0.93 l. Dissolved oxygen concentration was 1.13 to 5.53 l. Depletion of oxygen was noted frequently in canals heavily infested with salvinia.

Organic recycling in integrated farming utilization or livestock waste for fish production

In order to study the comparative efficacy of organic manuring with cowdung urine and waste water in the farming of common carp *Cyprinus carpio* and Mrigal *(Cirrhinus, Mrigala)* an experiment was initiated in March 1984. The indications are that cowdung and urine are useful in the culture of the above fish varieties. The trial is in progress

Paddy cum fish culture

An experiment was initiated to study the growth and production of fishes and prawns in paddy fields when cultured along with paddy crop and to test the feasibility of paddy cum fish culture in the wet lands. The experiment is in progress. The results of the previous year (1983-84) is encouraging. The rate of production of fish in the paddy cum fish experimental plot was 240.40 kg ha 5 months.

Fish cum duck farming

In order to increase the fish production per unit area by combining duck farming with fish culture a study was started in January 1985. Observation so far made indicated that fish cum duck farming is better than control (fish alone). It is too early to draw any conclusion.

Studies on culture on fishes and giant fresh water prawns as follow up crop in paddy fields

An experiment was started to study the growth and production of common carp Indian major carps, cichalids and gaint fresh water prawns in the paddy fields where rice and fish are raised alternatively. The experiment is in progress and the result can be obtained only in September 1985 after the harvest of the fishes

Highlights

COCONUT

In a study of banana as an intercrop in coconut gardens in wet revealed that palayankodan with 3 suckers per hill was found to give maximum yield (56.5% increase over palayankodan with 1 sucker hill in the second ratoon crop

Effect of SAMPPI 3 (Macro micronutrient formulation) on the yield and disease intensity of root (will) affected palms

It has been found that SAMPPI 3 @ 3 ml 3 l water sprayed 4 times a year on a palm recorded an yield increase of 19.28%, over the pre-treatment yield. Regarding the root (will) disease the treated palms showed a marked decrease in the D. I.

VEGETABLES AND TUBER CROPS

Tapioca

Performance of short duration tapioca varieties

In a performance study with short duration cultivars of tapioca it was found that the local cultivars Ambakadan recorded the highest yield (29 96 t ha) followed by Ramanthala (22 77 t ha) Ambakadan excelled in cooking quality as well

Biological control of Salvinia

In the studies conducted on the biological control of *Salvinia molesta* it has been found that the small weevil *Cyrtobagous salviniae* is very effective in controlling the aquatic weed within a year of its introduction to thick mass of the weed, the growth is suppressed and water pockets become visible This insect can be very effectively recommended for use in getting rid of this aquatic weed menace in ponds and waterways of Kuttanad

FISHERIES

Assessment of the productivity and ecology of fish ponds, channels and open waters in and around RARS Kumarakom

Data on the water quality and productivity have been regularly collected. The gross primary productivity of the waters in and around the RARS Kumarakom ranged from 28 48 mgc m^3 hr in the paddy field waters to 1196 33 mgc m^3 hr in one of the man made ponds in the area. Dissolved oxygen concentration ranged from 0 68 ml 02 L in the reservoir at the RARS to 5 53 ml 02 L in the man made pond

Paddy cum fish culture

In this experiment, the production of fish was 240 40 kg 5 months addition to the paddy grains of 608.27 kg/ha.

The culture of *Macrobrachium rosenbergii* in the canal system of RARS Kumarakom gave a production of 325 kg/ha/6 months and 312.5 kg/ha/8 months.

Organic recycling in integrated farming, utilization of livestock waste for fish production.

This experiment was completed in March 1985. It was seen that Mrigal recorded maximum growth in the pond manured with cowdung giving a production of 670 kg/ha/year where-as common carp exhibited maximum growth in the pond manured with cow-urine giving a production of 760 kg/ha/year. In the control pond the production was only 378.63 kg/ha/year.

Visitors

Dr M. J. Sebastian, Dean, Fisheries Faculty of the KAU visited the station during August 1984 to attend the NARP regional workshop of the problem area.

Sri Dinesh Sharma IAS, Asst. Collector, Kottayam visited the station on 9-1-85 to study the working of the station.

Sri Balasubrahmaniam, Sr. Scientist, ICAR visited the station in connection with the evaluation of the progress of research activities of the station during March 1985.

A batch of farmers from Arunachal Pradesh visited and studied the activities of the station during March 1985.

1.19 RICE RESEARCH STATION, MONCOMPU.

Rice Research Station, Moncompu was established in the year 1940. In 1963, it became a fullfledged Regional Station to handle plant breeding and problems connected with Agronomy, Soil Science, Agricultural Entomology and plant Pathology.

Rice Research Station, Moncompu is located in Champakulam Village of Kuttanad Taluk in Alleppey District. The Station is equidistant from Alleppey and Changanacherry being 12 kms. both ways and is located on the northern side of the road from Changanacherry to Alleppey. The total area of the farm is 8.7 ha of which 2 ha comprise garden land and the remaining area constitutes double crop paddy lands.

Dr C. A. Joseph, Professor (Plant Breeding) continued as the officer in charge of the station

Sri Jim Thomas and Smt. Radha Devi, Assistant Professors were granted leave for study purposes

Training programmes conducted in the station

Training on plant protection for Agrl. Labourers for one day with 125 participants

Training for high school students for one day with 63 participants.

Training for Lab to Land beneficiaries for one day with 23 participants

Training on Audio visual aids for one week with 35 participants

Conducted Rice Day and Karshika Mela with 234 farmers.

VI Zonal Workshop of NARP & KAEP was organised at RARS, Kumarakom.

Scientific Consortium meeting of ORP.

Workshops Seminars attended

The Professor and 3 Scientists attended the AICRIP rice workshop at Bhubaneswar.

The Resource personnels of the station attended the advance workshop on T & V programme at KAU campus

The scientists of the station attended the workshop on KAU 2000 AD, the T & V workshop Alleppey, Kottayam, Quilon and Pathanamthitta as resource personnel, FACT Seminar Theruthy, two NARP Zonal workshop at Kumarakom. The Professor attended NARP Zonal workshop at Pilicode and Vellayani, a Seminar on Forestry education KAU, Agricultural Co-operation Seminar at Kottayam, Seminar on Advances on Crop Breeding at Gandhiji University, Kottayam and presented a paper on "Rice Breeding in Kerala - Problems and Prospects" and Workshop on farm trials organised by KAU and Department of Agriculture.

Number of research projects as on 31-3-85 was 51.

Concluded Project

Crop Improvement

Variety Karthika has been released from the station.

Crop Management

Seed rate studies on rice

During the additional crop season, 100 kg/ha seed rate was found to be the optimum (yield 3233 kg/ha). During the previous season also 100 kg/ha was found to be optimum for better yield.

Seasonal variation in pH, EC, Chloride, Sulphate etc. of soil, river and well water

The data generated in the experiment are being statistically analysed to find out correlations on the different constituents of the water from different sources.

Plant Protection

Chemical control of sheath rot

Hinosan (1 ml/lit) Bavistin (1 g/lit) Dithane M45 (2.5 g/lit) and Topsin-M (1 g/lit) were found to be significantly superior to unsprayed check in controlling the disease.

Ongoing Projects

Screening short duration rice cultures during punja season at Kuttanad and kole lands

The check variety Annapoorna recorded the maximum yield (3327.3 kg/ha) followed by Culture 4741-14 (3085.3 kg/ha).

Evolving a short duration semi tall variety of rice

During the additional crop season, Culture No. 153-1 gave the maximum yield (3401.1 kg/ha) followed by Culture-200 (3277.9 kg/ha).

Breeding rice varieties resistant to BPH

In the multilocational trials, Culture 170 ranked first followed by Culture 126 and 93.

In the BPH RVT of Kharif 1984 Culture No. 126 ranked second and Culture No. 168 fifth in grain yield when the mean of 11 locations was taken. Culture No. 126 was superior to Jaya, CR. 57-MR. 1523 and Mahsoori at Moncompu, Aduthurai, CRRI and Bhubaneswar. Culture No.168 was superior to Jaya and CR. 57-MR.1523 at Moncompu and Aduthurai.

In PET-2 of Kharif 1984 Culture No.93 ranked 8th when the mean of 22 locations was taken.

Uniform Variety Trial-2 for Kharif 1984 (AICRIP)

Out of the twenty six varieties tried, Entry No. 205 recorded the highest yield (5530 kg/ha). Entry No.201 and 205 were selected for further trial of this station based on yield and pest and disease tolerance.

Uniform Variety Trial-3 for Kharif 1984 (AICRIP)

Thirty two entries received from AICRIP were tried and Entry No 301 recorded the highest yield (6330 kg/ha) followed by Entry No 305 with an yield of 6167 kg/ha. Entry No.301, 305, 306,308 and 309 have been selected for further trial in the station based on yield and pest and disease tolerance.

Uniform Variety Trial-3 Rabi 1984-85 (AICRIP)

Entry No 309 recorded the highest yield ie. 5411 kg/ha followed by Entry No.312 having an yield of 5248 kg/ha.

Brown Plant Hopper Resistant Variety Trial for Kharif 1984 (AICRIP)

Entry No 1131 recorded the highest yield ie. 6398 kg/ha followed by Entry No 1132 with a per hectare yield 6210 kg. Entry Nos.1104, 1105 and 1130 were selected for a Comparative Yield Trial based on plant type and pest and disease tolerance.

Sheath Blight Resistant Variety Trial for Kharif 1984 (AICRIP)

Twenty three entries received from AICRIP were tried and Entry No 1515 recorded the highest yield of 4000 kg/ha followed by Culture-1514 with a per hectare yield of 3860 kg.

Evolution of Blast Resistant Varieties of rice

One hundred and fifty four F_4 cultures were inoculated with blast fungal culture in order to identify blast resistant plants during the Kharif season.

During Punja 1984-85, 204 F_4 cultures were screened for blast resistance and 106 single plants were selected for further studies on F_5 cultures

Developing male sterile lines

Fresh crosses as well as back crosses were made during 1984-85 using male sterile lines and indigenous varieties

Adaptive trial with Culture-24-20

Culture 24-20 is of very low duration compared to the checks Annapoorna and Culture 1537-2 and hence the yield was also low in the locations tried

Agronomy

Studies on the nutritional requirement of Pre-release Cultures-I

The varieties and fertiliser rates have significant effect on plant stand Panicle and grain yield. During additional crop season Culture 170 gave the highest yield of grain when 90 kg N, 45 kg P_2O_5 and 45 kg K_2O were applied (3450 kg ha). The Culture 126 at fertiliser rates 90:45:45 produced the maximum grain yield of 5933 kg ha during Punja season. This shows that the fertiliser dose of 90:45:45 produced the maximum grain yield.

Studies on the nutritional requirement of Pre-release Cultures-II

Among the varieties Karthika produced maximum yield of 3915 kg ha during the additional crop season whereas Pavizham produced the maximum yield of 3358 kg ha during Punja season. Among the fertiliser levels, 110:55:55 produced highest yield during additional crop season and 90:45:45 produced highest yield during Punja season.

Seed rate studies for high yielding rice varieties for Kuttanad

The effect due to seed rate is not significant but the seed rate of 80 kg/ha produced maximum yield of 3233 kg ha. The effects due to varieties vary significantly. The variety Karthika produced the maximum yield of 3520 kg/ha.

Nitrogen management in direct sown short duration rice

Maximum grain yield is produced when nitrogen is applied in equal splits during tillering and panicle initiation stages in the additional crop season. But during Punja season, maximum grain yield of 3885 kg/ha is produced when nitrogen is applied in two equal splits during basal and tillering phases.

Nitrogen management in direct sown medium duration rice

The maximum yield of 2700 kg/ha was produced when nitrogen was applied in three equal splits on 15 DAS, 35 DAS and 55 DAS

during additional crop season. This treatment has yielded maximum during Punja season also.

Weed control trial in direct sown rice under puddled condition (AICRIP)

Among the various chemicals tested, Machete @ 1 kg ai/ha is found to be most effective in controlling weeds followed by 2, 4-D EE @ 0.8 kg/ha.

Highest grain yield of 5135 kg/ha was obtained where Arozin was applied at the rate of 0.3 kg ai/ha.

Weed control trial in transplanted rice

Among the seven herbicides tried, 2,4-D EE @ 1.0 kg ai/ha, Delchlor @ 1.5 kg ai/ha are as good as hand weeding in controlling weeds. Maximum grain yield is obtained from the 2,4-D EE treatment.

Agricultural Chemistry

Effect of top dressing of complex fertilisers on the yield of rice

Application of 20:20 complex fertilisers 30 days after sowing gave the highest grain yield (3437 kg/ha) followed by the split application of fertiliser at 10 DAS and 30 DAS (3350 kg/ha).

Effect of application of lime on economising the use of inorganic nitrogen

During additional crop, the grain as well as straw yield were found to be higher in which lime at the rate of 600 kg/ha was incorporated and basal dose of nitrogen not applied. Grain yield obtained was 1710 kg/ha.

In the Punja season maximum grain of 1695 kg/ha was obtained when the full dose of basal nitrogen was applied along with lime.

Split application of potash to rice

Maximum grain yield (2437 kg/ha) and second best straw yield is obtained from treatment which received 50 kg potash given as 50% basal and 50% at the P.I stage in the additional crop.

During the Punja season, three split applications 45 kg K_2O/ha (basal, at tillering and P.I stage) gave the maximum yield (3537 kg/ha).

Quality of ground water in summer season in Kuttanad

There is a general increase in acidity with depth suggesting the possibility of potential acidity deep in the soil.

Evaluation of Mussorie rock phosphate in acid soils as a source of 'P' to low land rice

Grain and straw yield were maximum in the treatment which received 30 kg P_2O_5/ha as rock phosphate as basal and 30 kg P_2O_5/ha as single super phosphate at tillering in the additional crop season.

During Punja season, highest grain yield of 4240 kg/ha was given by the treatment which received 60 kg P_2O_5/ha as rock phosphate + Pyrite in 1:1 w/w ratio, basally

Effect of pre-soaking of seeds in solutions of zinc and copper on the growth and yield of rice

Dipping the seeds in 1% copper sulphate solution before sowing gave the highest grain yield during the additional crop season

Evaluation of Mussoriephos coated urea for 'N' efficiency in low land rice

During the additional crop season split application of 90 kg N/ha as prilled urea has given the highest grain yield of 2174 kg/ha. For 60 kg N/ha, gypsum coated urea basal gave the highest grain yield (2132 kg/ha).

For the Punja crop, gypsum coated urea at the rate of 90 kg N/ha gave the highest grain yield. At 60 kg N/ha neem coated urea produced the highest yield of 3109 kg/ha.

Tolerance (screening) studies on high yielding varieties of rice for acidity, salinity, iron, aluminium and manganese under Kuttanad conditions

PTB-26, Cul. 25331 and Vyttila-45 showed tolerance under field conditions.

Nitrogen management for low land rice in pest and disease endemic areas

Prilled urea in splits have given the highest grain yield of 2073 kg/ha during the additional crop. For the Punja crop, the treatment which received neem coated urea basal has given the highest grain yield of 3828 kg/ha.

Season variation of pH, EC, CO_3, HCO_3, Cl, SO_4, Ca Mg & Fe in soil water extract, surface water and river water

The results give basic information on the variation in PH, conductivity, bi-carbonate, carbonate, chloride, sulphate, calcium, magnesium and iron of soil water, river water and well water so that comparison can be made and inference derived after statistical analysis.

Agricultural Entomology

New insecticidal trial (AICRIP)

In the case of tissue borers, Oncole, Coroban and Mocap granules are as effective as carbofuran. In the case of external feeders also these chemicals are effective along with sprays of chlorpyriphos and monocrotophos.

Insect pest control trial-II (AICRIP)

Hostathion can be effectively used for controlling whorl maggots in area where insect is a serious problem.

Replicated trial with quinalphos formulations

Agrophos or Ekalux @ 750 ml/ha are effective in controlling leaf roller, but not so effective in controlling stem borer and gall midge.

Studies on varietal resistance of selected breeding lines and donors to different insect pests

Fifteen entries have been found to be resistant to brown plant hopper 14 entries have been found to be resistant to gall midge, 14 entries have been found to be resistant to leaf folder and three entries showed multiple resistance to different pests.

Fixing up dose of carbofuran in relation to plant density

For the additional crop and Punja season, carbofuran @ 0.75 kgai/ha is most effective for the control of leaf roller, followed by the next higher dose 1 kg ai ha.

Fixing up an economic dose of carbaryl and quinalphos for the control of pests of rice

All the treatments of quinalphos and carbaryl at the test doses (carbaryl 0.5 kg, 0.75 kg, 1.0 kg & 1.25 kg ai/ha and quinalphos 0.10,0.15, 0.20, 0.25 kg ai ha) were significantly superior to untreated control in their effectiveness against the pests during the additional crop season.

For the Punja season, quinalphos @ 0.25 kg ai ha and carbaryl 1.25 kg ai ha are found to be significantly superior in their effectiveness in controlling the pests.

Pest management trial

Pre-scheduled pest management proves best with all the varieties.

Observational trial with Orthene

Orthene @ 625 g ha was found to control leaf folder and stem borer giving a higher yield than control.

Observational trial with Monocron 36 S L

Monocron performs better when compared to untreated control.

Plant pathology

Screening of rice varieties against important rice diseases

Significant difference was noted in the 10 varieties tried for the brown spot grain infection and stack burn leaf and grain infection. C R 141-5056 showed the lowest grain infection by brown spot. The variety, IR-2058-78-1-3 gave grain yield significantly superior to others.

During Punja season, significant difference between 16 varieties tried was obtained in the case of sheath rot, brown spot leaf infection, stack burn leaf and grain infections and grain yield.

Screening of rice varieties against false smut and stack burn

No incidence of false smut and lowest stack burn disease score was noticed in Jaya, when 49 cultures were compared.

National Screening Nursery-I

Reactions to sheath blight (major stress), sheath rot (other stresses) and days to 50% flowering were recorded. Among the total entries, five were showing good tolerance to both sheath blight and sheath rot (TR x G-17, CR-260-77, CR 710-13, RP-1822-15-2-3 and RP-2090-71-3-2-2)

Evaluation of common fungicides for the control of stack burn disease of rice

The results show that fungicides when applied at 60 DAT gave the lowest disease incidence. Among the different fungicides, Dithane M-45 gave the maximum control of grain infection and Fytolan gave the lowest leaf infection.

Epidemiological studies in the important rice diseases in Kuttanad

Three plantings were done during the additional crop season. The plantings on 26-6-84 and 17-7-84 showed high incidence of sheath blight whereas sheath rot incidence was high in the first plantings and brown spot and stack burn disease in the second plantings. Out of the four varieties, Jyothi was more susceptible to sheath blight and Jaya to sheath rot.

Three series of planting were tried during Punja. Sheath blight incidence was high in the 1st series of plantings for the varieties Bhadra and T (N)-1. Sheath rot was high in the 3rd series of planting for the varieties Jaya and Jyothi and T (N)-1 in the first and third series of plantings.

Chemical control sheath rot

Hinosan 5 EC @ 1 ml/litre, Bavistin 50 WP @ 1 g/litre, Dithane M-45 @ 2.5 g/litre and Topsin-M @ 1 g/lit. were found significantly superior to Foltaf @ 1.25 g/litre and unsprayed check.

For the Punja season, the Foltaf and Topsin treated plots were showing lesser disease intensity and spread compared to other treatments.

Adaptive trial in cultivator's field against sheath blight, neck blast and bacterial leaf blight

Against bacterial leaf blight Plantomycin @ 750 g/ha and against sheath blight Derosal @ 500 g/ha were found to be effective.

Chemical control of sheath blight

For the Punja season, Validamycin was found to be the best fungicide for checking both disease intensity spread.

Special disease and pest survey

The padasekharoms of the Kuttanad Koottumundakan area of Shertallai and Onattukara region were surveyed during the cropping seasons. The pest and diseases were identified and suitable remedial measures recommended.

Production oriented survey

The production oriented survey of Kuttanad and Onattukara region in Alleppey Districts were taken up during the Kharif and Rabi season.

SOCIAL SCIENCES

a) Agril. Statistics

Effect of plot size on probable error in field experiments with rice

The results show that the sample correlations between plot size and probable errors of mean, plot size and probable error of standard deviation were significant. An inverse relation between plot size and probable error of coefficient of variation was observed. Intra class correlation between yield of plots for different plot sizes showed significance for plot of size 18 m^2 and above.

Study of inter dependance of climatological factors and yield of rice with reference to the additional crop and Punja crop in Kuttanad

Covariance matrices of the data on per hectare yield of paddy and meteorological observations have been developed for doing the principal component analysis.

FISHERIES

Cage culture of fish in public waterways of Kuttanad

Four different types of cages were installed and better growth rates are recorded in the case of split bamboo cages and bamboo framed polythene cages when compared with bamboo framed nylon netting cages.

Monoculture of Carp in homestead ponds with single stocking and multiple harvesting

The experiment was conducted in a farmer's pond. 2000 Nos. of common carp fingerling were stocked. Harvest after six months showed that they acquired weight ranging from 250 600 g.

AGRICULTURAL EXTENSION

Lab to Land Programme

The following inputs were supplied to the beneficiaries under this scheme:

Items	*Quantity*
Poultry birds	250 Nos
Poultry feed	250 kg
Goat	12 Nos
Cattle feed	210 kg
Paddy seeds	275 kg
Coconut seedlings	200 Nos
Fertilisers: Urea	538 kg
MOP	200 kg
M Phos	595 kg
Sprayer	1 No (common input)

Six group discussions and 6 group meetings were held on different aspects of Agriculture. Two training programmes were organised for the benefit of farmers.

Village Adoption Programme

Under the Village Adoption Programme of this station during the year 1984-85, two nutrition garden demonstration plots were laid down at Champakulam Village with the approval of the Inter-disciplinary group (problem zone). An area of 10 cents each was selected and the demonstrations, conducted in the field of Sri. Krishna Panicker, Ananda Mandiram, Thekkekara and under the supervision of Rev. Fr. Philip Kunnumpuram at St. John's Church, Thekkekara. The following seed materials @ 50 g. each viz. Brinjal, Cucumber, Bottlegourd, Winged bean, Bhindi, Ash gourd, E 1552 pulses, Chillies, Pumpkin, Amaranthus, Bitter gourd Snake gourd, Kanakamani and Dolichos bean were supplied for raising the crop.

Training

Eight one day and two one week trainings were conducted for the benefit of agricultural labourers and farmers, organised by ORP and Department of Agriculture. Altogether, 279 persons were trained.

Seminar

Conducted Rice Day and Karshika Mela Celebration at this station during March. Altogether, 234 farmers including Lab to Land Programme beneficiaries and the farmers in and around Kuttanad attended the programme. Nearly 67 officials belonging to input agencies and Department of Agriculture participated. In this connection an Agricultural Seminar and field visit were organised. A Krishi dharsan was conducted for the benefit of farmers deputed by different co-operative societies of this area.

Workshop & Training

The T & V monthly workshop for Kottayam was organised at this station during February. Field visits to Vadakkekari, Madathanikari, Sreemoolam and E. Block were organised. A special lecture on wet land weeds and their control was delivered by Mr. M. S. Nair, Asst. Professor (Agron) of this station.

The VI Zonal Workshop of NARP & KAEP was organised at Regional Agricultural Research Station, Kumarakom. Scientists of this station attended the programme and the ongoing research projects were discussed.

Training attended

Assistant Professor (Extn) attended a training on Extension methods in communication media at the Directorate of Extension for one week.

Highlights

Variety Karthika (MO-7) has been released from the station.

Cultures 93, 126, 169, 170, 153-1, 200 and 204 are in the final stages of screening and selection.

A bio-rational dose of quinalphos 25% EC @ 0.75 l/hectare or 0.1875 kg ai/ha against major pests of rice is recommended.

For carbaryl, a bio-rational dose of 1 kg ai/ha (2 kg of 50% WP/ha) is recommended for rice pests.

Soaking of paddy seeds in a solution of Cu SO_4 (0.25%)+$ZnSO_4$ (1%) for 24 hours before keeping them for sprouting ensures higher yield of grain.

Visitors

Sri Jagadish Joshi IAS, Director, Ministry of Labour, Government of India and Brig. N. H. Narayan, NCC, visited the station.

1.20 ALL INDIA CO-ORDINATED RESEARCH PROJECT ON AGRICULTURAL DRAINAGE UNDER ACTUAL FARMING CONDITIONS ON WATERSHED BASIS (ICAR), KARUMADY

This scheme was officially taken up with 75% assistance of the Indian Council of Agricultural Research and 25% share of the Kerala Agricultural University. The scheme was formally started at Karumady with the appointment of a Junior Assistant Professor on 1-12-81 and put into active functioning from March, 1982 with the posting of an Assistant Professor as in charge of the Scheme.

Major objectives

To comprehend the effect of a surface and subsurface drainage system on the movement of soil liquids.

To study the pattern of hydrological cycle occuring in the watershed area and its importance and influence on the drainage.

To develop a feasible technology for the layout of subsurface drainage suitable to peat and muck soils.

To develop criteria for design parameters of surface drainage.

To develop the drainage pattern required for different crops to optimize yield and income

To evaluate the feasibility of the return flow for irrigation in relation to water quality ratings

To evaluate the socio-economic benefits accrued from the drainage projects.

The project area is 'Kavil Thekkumpuram Padasekharam', a typical representative tract of kari land, with a watershed area of 88 919 ha and paddy field of 75 233 ha. The project area lies 4 km east of Ambalapuzha junction on NH 47 and towards the southern side of Ambalapuzha-Thakazhy Road. The office, laboratory and stores are housed in rented buildings at Karumady.

Sri. U. Jayakumaran, Assistant Professor (Agron.) continued to be in charge of the Scheme.

Developments during the year

Monitoring of surface and subsurface water level variation was continued.

Variation in quality of water both surface and subsurface was continued to be recorded at weekly intervals.

Survey work on the evaluation of drainage pumpsets of Kuttanad was conducted.

Field investigation on main drainage channels were taken up and the estimate on their widening and deepening completed.

Complete field work of the project "Technology of laying subsurface drainage system in the kari lands of Kuttanad" is over. About 2.5ha of farmers' field is laid with surface tile drains and the observations on the project will start as soon as the season is on.

Ongoing Projects

Periodical changes in the quality of surface and subsurface water in the project area.

Seasonal fluctuation of ground water table with reference to surface water level and characterisation of aquifer in the project area.

Evaluation of drainage pumpsets— studies on the efficiency of drainage pumpsets in the Kuttanad area.

Development of a suitable technology for the subsurface drainage system in the kari lands of Kuttanad.

Assessment of hydraulic properties of the tile drainage system.

Theoretical prediction of drain performance in terms of water entry quality of the drains.

Effectiveness of tile drainage system in the performance of rice crop in the kari land.

The water samples were drawn at weekly intervals both from surface and subsurface water and salinity and acidity levels were estimated. Interpretation of the data exposed the following observations:

No definite relationship could be evolved between the pH of the drained water from the field and the observed water level in the project area. However, a slight increase in the pH was noticed as the water levels in the project area increased. The pH always remained in the acidic level. The acidity and total soluble content of water in the drainage channel was always higher than that in the nearby waterways.

Preparation of water contour map and hydrological map of the project area on seasonal fluctuations of ground water table with reference to surface water level and characterisation of aquifer in the project area.

Ground water table fluctuations were observed at weekly intervals from 24 numbers of observation wells installed in the field. Water level variations in the waterways were recorded from 4 different points. The hydrostatic pressure of the project area was also tested using 4 piezometers ranging from the depth of 0.75 m to 4.5m. The observations were tabulated and graphs were prepared to find out the trend of the water movement and the following inferences were drawn:

The field was almost over saturated or flooded during the year under report and the surface and ground water levels in the field were found to keep the same elevation. Hence a clear cut ground water movement was not traceable.

The surface water level in the project area, was always lower by 0.5 m to 1m than that in the water bodies out side the project area.

The observations from the piezometers revealed that certain pressure exists towards the deeper strata which is quite contrary to the observations during the year 83-84. Hence further explorations in this field are called for.

Development of a suitable technology for subsurface drainage system in the kari lands of Kuttanad by assessment of hydraulic properties of tile drainage system.

Nine lines of lateral drains with a total length of 775m has been laid in the project area out of which 5 lines are at 15 m apart and 4 lines at 30m apart. The tiles are of 110 mm dia and 60 cms long and are made of clay. They are laid at a slope of 0.2% at an average depth of 0.775m. The drains are provided with an envelope of river sand with an

average thinkness 10-15 cm all round the drain. All the 9 lateral drain lines are connected to a PVC collector drain through a collection drum. The collector drain opens into a drainage sump from where the drained water is pumped out by a 5 HP electric motor pumpset. This experiment covers an area of 2.5 ha where a series of observation wells (120 nos) are installed. Thus the complete pre-observation work is over and the observations will be taken along with the crop season.

Development of a suitable technology for subsurface drainage system in the kari lands of Kuttanad.

The objective is to assess the effectiveness of tile drainage system in the performance of rice crop in the kari lands.

A remarkable improvement on the growth and yield of rice crop and also in the fertility of the root zone has been revealed from the pilot study conducted during 83-84 on subsurface drainage system. Only the lay out was concluded and this detailed experiment will bring out the magnitude of incremental productivity of kari lands with laying of suitable tile drainage system. The study will also help to evaluate the economic feasibility of the project.

Rice will be grown in the field, laid with lateral drains by giving uniform package of practices in the whole experimental area (2.5ha). The standing crop will be divided into different strips of 5m width along the drain line.

Visitors to the project

Sri. M. Jayakumaran, Senior Scientist, C. S. W. C. R. T. I, Ootacamund visited the project on 20-12-1984 as a part of training programme for a batch of 20 trainees from all over India.

Dr. A. K. Bhattacharya, S3 Scientist, Water Technology Centre, New Delhi, visited the project on 4-2-1985 and held discussions regarding the drainage experiments.

Highlights

Based on the observations and experiments conducted by this centre, the following points are being highlighted.

The farmer's practice of intermittent technique during the cropping season is found to be a sound technique in the absence of a suitable subsurface drainage system to keep the acidity to a tolerable limit. A pilot study on the subsurface drainage system revealed that:

It is an effective technique for the controlled leaching of toxic salts from the root zone area of the rice crop in the kari lands.

The water quality studies in the project area showed the importance of the exploitation of other possible avenues of water sources for good quality irrigation water since the water bodies surrounding the area are contaminated by salinity and acidity.

Drying of the field and thereby free aeration should be avoided as far as possible to prevent production of free acidity.

The presence of an impermeable layer is doubted at a depth of 4.5 m.

Earthenware tile drains were found to be more effective and economical than the P. V. C drains.

1.2 SUGARCANE RESEARCH STATION, THIRUVALLA

The Sugarcane Research Station, Thiruvalla came into existence on 20th December, 1975 when 25.66 acres of Government land which was being held by the Pumpa River Factory, was handed over to the Kerala Agricultural University. Research programmes were started in 1977 under a small unit of the All India Co-ordinated Sugarcane Research Programme. In order to strengthen the research activities on systematic lines to tackle the many problems faced by sugarcane growers, the Kerala Agricultural University sanctioned a scheme for intensification of research in the crop at a total cost of 23.12 lakhs during the 6th plan period, with Vellanikkara as the main centre and Thiruvalla, Idukki, Chittoor and Punaloor as sub centres. The centre at Punaloor was subsequently cancelled owing to the non co-operation of the State Farming Corporation. Subsequently in the year 1983-84 an ad hoc scheme for the survey, appraisal and control of major diseases of sugarcane was sanctioned by the ICAR with full financial assistance for a period of three years.

The farm is located at Kallumkal on the bank of Manimala river 6 km south of Thiruvalla town. Due to want of building facilities in the farm site the office is functioning in a rented building 3 km north of the farm. Eventhough the gross area of the farm is 25.66 acres the net area available for cultivation is 21.57 acres. The geographical location of the farm is on 9.6° N latitude and 76.5° E longitude and above 25.14 m M S L. The entire area of the farm gets inundated during floods. The soil is rich alluvial with a mean pH of 5.5.

Sri S. Sukumaran Nair continued to be in charge of the Station. Sri Babu George, Ph. D. Scholar of the College of Agriculture, Vellayani was awarded the senior research fellowship sanctioned under the ICAR adhoc scheme. Sri A. V. Mathew has been selected for the award of senior research fellowship in Plant Pathology by the ICAR.

Dr. N. Neelakantan Potty attended the 12th AICRP workshop on sugarcane from 1st to 4th November, 1984 at Navasari, Gujarat. A special lecture on "red rot disease of Sugarcane" by Dr. Kishan Singh, Director, IISR, Lucknow was arranged on 11-6-1984 at the Agricultural College, Vellayani in co-operation with Department of Plant Pathology. The lecture was attended by the staff and students of the College as well as by the scientists of the station.

Sri Babu George, Ph D Scholar, College of Agriculture, Vellayani is doing his thesis titled "virulence variation and survival of *Colletotrichum falcatum* in Kerala".

Numbers of research projects as on 31-3-85 is 20

Research Highlights

Crop Improvement

Experiments designed to study the Morphophysiological characters associated with resistance to waterlogging have yielded useful and important leaf indices for selection of biotypes for flood prone areas. They are length, width and short narrow erect leaves with less weight/unit area. Varieties with these attributes will do well in flood prone areas.

Experiments conducted in this station revealed that CO-62175 can withstand drought conditions much better than other varieties cultivated in the region.

In the project entitled "Evolution of new varieties for different agroclimatic conditions of Kerala", two clones out yielding CO-62175 have been located. Their stability in yield expression is being further evaluated in a varietal trial during the year. These two clones are in an advanced stage of experimentation. A record number of 603 clones are currently in various stages of selection process.

Crop Management

The necessity of liming of acid soils for exploiting the yield potential of sugarcane was conclusively proved. Even the most acid tolerant variety like CO-997 brings about a mean yield increase of 5.8 t/ha/year by applying 450 kg lime per hectare once in three years.

Results obtained in the trial on increasing efficiency of applied nitrogen by using nitrification inhibitors for the last three years proved that at low levels of application of N (50 kg ha), yield increase to the tune of 4.8 t/ha could be obtained by mixing urea with maroti cake and neem cake at the ratio of 6:1.

Confirmatory results on the requirement of additional dose of fertilser at least to the extent of 25% of the recommended dose for the ratoon crop, was another significant result obtained in the present year.

The role of gap filling as an yield component was further confirmed during the year. Gap filling @ one three budded sett for every 50 cm gap brings about a mean yield increase of 3.7 t/ha.

Results obtained in the varietal and plant population interaction has shown that under constant level of fertilization, yield improvement can be brought about by narrowing down the spacing from 90 to 60 cm.

Application of nitrogen and potash along with phosphorus at the time of planting was proved beneficial in helping the crop to tide over drought better and to get maximum yield under conditions of rainfed management. The modified schedule brings about an increased yield of 15.7 t/ha which works out 27.9% over the present recommended practice.

Plant Protection

The results of the experiments on weed control have indicated that yield loss due to weed infestation is around 38.3 percent. Use of chemical weed control can match the hand weeding efficiency to the extent of 93 percent. Among the chemicals tried, Azulox @ one kg ai/ha was found to be the best.

Wilt disease was found to occur and cause serious damage up to 30% to cane crop along the Pumpa River bank at Arattupuzha and Kadapra.

A scientific nursery programme was initiated in co-operation with the Pumpa River Factory, with the variety CO 7704 to arrest the spread of red rot disease. One thousand hectares of sugarcane area is expected to be covered with CO-7704 by January, 1987.

A moist hot air treatment plant for heat treatment of setts to guard against the occurrence of seed piece transmissible diseases has been got fabricated with financial assistance from the ICAR.

Twenty two genotypes resistant to red rot disease of sugarcane were located in the varietal evaluation for red rot resistance.

Ongoing Projects

Increasing efficiency of applied nitrogen fertiliser

The experiment was conducted during the period 1982 to 85 in one plant and two ratoon crops. The experiment was conducted in Split Plot Design with levels of nitrogen (50, 100, 150 kg/ha) in the main plot and sources of inhibitors (neem cake, neem cake, neem oil and control) in the sub plots replicated four times. The results showed that at lower levels of nitrogen, nitrification inhibitors brought about an increased per hectare yield of 1.52 t for neem cake and 1.71 t for neem cake. As per quality, inhibitors had no effect. As also tried by the ICAR the experiment is being repeated with higher level of N and urea super granules.

Effect of soil amendments on the yield of plant and ratoon sugarcane in acid soils

The experiment was conducted during 1982 to 85. The mean data on the yield of plant and ratoon crops indicate that application of lime @ 150 per cent of the lime requirement increased the yield by 5.8 t/ha when lime was applied once in three years. CaO though found

better to plant crop failed to retain its superiority in ratoon crops which may be due to its complete utilisation owing to the higher reactivity in the soil. The results also showed that irrespective of the source, application of lime showed tendency to marginally improve the percentage of sucrose.

Crop Improvement

Zonal Varietal Trial - I

The experiment was started during 1982-83 and the second ratoon is in the field. Seventeen varieties are being tried. Among the varieties CO-8016 recorded the highest shoot count, millable cane height and yield (Yield 79.4 t/ha). The experiment is being repeated in the second ratoon.

Zonal Varietal Trial - II

This project has also been taken up as suggested by the ICAR to spot out the best variety suitable for the region. Fourteen varieties are being tried and the plant crop results showed that CO-62175 continues to maintain its superiority for maximum height, girth, yield and juiciness. The variety CO-8021 recorded the maximum Pol value of 17.9 per cent but the yield was not found to be satisfactory. However, the performance of the varieties is being assessed in the two ratoon crops.

Fluff Exchange Programme

This project is to evolve suitable varieties for the peninsular zone. The project is in various stages of implementation like the seedling studies, Progeny Row Trials and the Initial Evaluation Trials. During the year seven crosses have been done and the seedlings have been raised.

Crop Improvement

Varietal Trial - I

This project is to isolate the most promising varieties for high yield and sugar from among the varieties selected from the screening trials of the previous years. This is the first ratoon study and the results showed that CO-771 gave the highest yield. In the plant crop CO-62175 was the highest yielder. As regards quality, CO-7704 was the best among the varieties tried. An yield comparison shows that COC-771 and CO-62175 were on par.

Screening of sugarcane varieties

This project is to identify suitable high yielding quality cultivars suited to the alluvial soils of Kerala. Thirty five varieties were selected from the germplasm collections consisting of 135 varieties. The study of the varieties for the first ratoon showed that CO-8131 gave the highest yield and was significantly superior to CO-62175, the local-high yielding type; CO-8015 and COM-7712 followed in the order of preference. The quality characteristics showed that CO-8131 is the best type followed by CO-8012.

Evolution of new varieties suitable for the different sugarcane tracts of Kerala

The project is to evolve varieties suitable for the different agro-climatic zones of Kerala with special reference to requirement of each tract through hybridisation and seedling selection. The project is in various stages of experimentation like Varietal Trial series II and III, Comparative Yield Trial, Initial Evaluation Trial, Progeny Row Trial and seedling studies.

Crop Management

Fertiliser and gap filling needs of ratoon of two sugarcane varieties

To find out the need of fertiliser and gap filling in ratoon crops of sugarcane, an erperiment was laid out in 1982 with two varieties, namely, CO-62175 and CO-740 with two levels of gap filling (gap filling for every 50 cm with one three budded sett and no gap filling) and three levels of fertiliser (75, 100 and 125% of the recommended dose).

The results of the experiments for the second ratoon revealed that the varieties differ significantly in respect of growth and yield attributes. CO-740 which is considered a good ratooner produced significantly higher number of shoots, millable cane, height, number of internodes, yield and quality than CO-62175.

The effect of gap filling over no gap filling brought about a mean yield increase of 3.7 t/ha. Anplication of 125% of the recommended dose of fertiliser registered an yield increase of 3.8 t/ha, but this increased dosage did not affect quality.

Trial on the herbicidal control of weeds in sugarcane

This experiment was started to have information on dominant weed flora and efficacy of herbicides in the control of weeds in sugarcane fields. The experiment was started in January, 1984.

The results obtained from the plant crop showed that weedicide application brought about significant effect in control of weeds and in increased yield of sugarcane. The dominant weed flora identified were *Cyperus rotundus*, *Eleusine indica*, *Cynodon dactylon*, *Digitaria marginata*, grasses and other broadleaved weeds.

The best weed control treatment was found to be manual weeding at 30 and 60 days after planting. Among the herbicides pre-emergent application of Atrazine and Weedmaster applied immediately after and 60 to 70 days after planting and Atrazine application immediately after planting followed by 2,4-D at 60 to 70 days were found to be the best.

Varietal and plant population effects in sugarcane

This project is to study the plant population in varieties with and without the presence of shoots.

The results obtained showed that varieties differed significantly. CO 62175 was significantly superior to CO 785 in yield and juiciness. Variation in row spacing of 60, 75, and 90 cm brought about significant difference in germination shoot count and yield. Progressively closer row spacing increased the yield significantly over wider spacing.

Study of the morphophysiological characters associated with resistance to waterlogging in sugarcane

An observational trial was taken up to study the morphophysiological characters associated with resistance to waterlogging in sugarcane with seven varieties. The results showed that CO 449, Coimbatore 7654 and CO 62175 were the best among the varieties tried from the point of view of yield under monsoon floods. The high yield of these varieties appeared to be a function of high shoot production and their better conversion to millable canes.

The plant characteristics like narrow light leaves and thin small leaf sheath are some of the characteristics that make a variety resistant to waterlogging apart from waxy coating and pithiness of stem.

Trial on Mussorie Phosphate

A study to assess the comparative efficacy of Mussorie Phosphate and super phosphate individually and jointly as sources of phosphorus for sugarcane was taken up as an observational trial with 100 percent of P through Mussorie Phosphate 100% of P through super phosphate, 50% of P through Mussorie Phosphate – 50% P through super phosphate and one control.

The results showed that application of phosphorus through combining Mussorie Phosphate and super phosphate was the best treatment. The yield increase was 5.4 t ha over super phosphate and 8.85 t ha over Mussorie Phosphate, when the nutrient was applied in equal combination.

Effect of time and mode of application of fertilisers under rainfed conditions

This project was taken up to study the effect of time and mode of application of fertilisers under rainfed conditions.

The results showed that the varieties differed significantly in their expression of production potential, when grown completely under rainfed conditions, the increased yield of CO-62175 over CO-997 being 21.3 t/ha.

The effect of fertiliser application during different periods of growth phase of a crop revealed that application of full P, $\frac{1}{2}$ N and $\frac{1}{2}$ K at planting time and the remaining dose of $\frac{1}{2}$ N & $\frac{1}{2}$ K with receipt of summer

showers in April-May produced significantly higher yield, the yield increase over control being 15.79 ton/ha. This result suggests that basal manuring with N and K is imperative under rainfed condition for increasing sugarcane production.

Experiment to find out optimum levels of P and K for sugarcane

This experiment is to find out the optimum levels of P and K for sugarcane.

The data generated reveal that graded levels of P have brought about significant effect on germination, shoot, millable cane count and yield. The increase in yield by the application of 150 kg P_2O_5 over control was 10.76 per cent. Application of potash @ 100 kg K_2O/ha brought about an increased yield of 23.93 per cent over control.

Individually P and K levels tried in the experiment did not affect quality of cane. Application of 150 kg P_2O_5 and 100 kg K_2O together increased the yield over the mean effect of P and K significantly and the increase was 10.3 percent. But the combined effects were not pronounced in quality characteristics.

Effect of water stress on yield and quality of sugarcane

The objective of this experiment is to study the effect on yield and sucrose content of sugarcane, due to delay in water supply during the summer months on varieties CO-997, CO-62175 and CO-740.

The results obtained in the plant crop show that an irrigation interval of 20 days at 4 cm depth of water each time appears to be the economic optimum. As far as quality characteristics were concerned, varietal differences alone were significant suggesting that irrigation during the germination and growth phase did not affect quality.

Trial on Bhoosakthi

This observational trial has been laid out to find out the effect of Bhoosakthi (a soil ameliorant) on the growth and yield of sugarcane. The data collected show that application of Bhoosakthi @ 500 kg/ha one month before planting had recorded a marginal improvement in all the yield and quality attributes. However the real effect of the chemical can be ascertained only after taking the ratoon crop and conducting a replicated trial.

Trial on Microsakthi

An observational trial to study the effect of Microsakthi (a micro nutrient source supplied by Devi Chemicals) on sugarcane was conducted in three varieties, viz. CO.997, CO.449 and CO 62175. The data generated showed that the chemical could not influence an increase in the yield but there was an improvement in quality for brix and pol percentage in CO 62175 and CO 997. The trial is being repeated for the 2nd ratoon also.

Plant Protection

Survey, appraisal and control of the major diseases of sugarcane in Kerala

The scheme was started in July 1983 with financial assistance from the ICAR. The objectives of the scheme is to survey the sugarcane cultivated areas in the State for the occurrence of various diseases to work out the intensity of crop loss due to the disease and to suggest suitable control measures. During the period survey was conducted in the Mannam Sugar Mill area, Pampa River Factory area and high ranges of Idukki district. In the Mannam Sugar Mill area the major diseases identified were grassy shoot, tuber stunting, [illegible] blight and red rot. In the Pampa River Factory area red rot, GSD and smut were identified as the major problems. In the high ranges of Idukki district, GSD alone was the major disease identified.

During the year an [illegible] was conducted against red rot with 59 varieties in CO-83 series, 17 genotypes in CYT and 7 genotypes in the Varietal Trial. Out of the 59 varieties evaluated in CO-83 series, 22 were proved to be resistant and 22 were moderately susceptible. In the CYT 2 varieties were resistant and 8 were moderately resistant. Out of the 7 genotypes in the varietal trial one was resistant and 3 were moderately resistant.

Extension

The station participated in supplying the popular varieties, disease specimen etc. in sugarcane for the Tractor Fooram Exhibition.

A batch of nine final year B. Sc. (Ag) students from the College of Agriculture, Vellayani were given two weeks field training. A Krishi darshan programme was conducted on 29-1-1985 and 30-1-1985 in which seventy farmers were taken around the farm and explained the various research programmes of the station.

Farmers' day

A farmers [mela was organised in a most befitting manner, in the adopted village at Kadapra on 23-3-1985. About 150 elite farmers including the beneficiaries under Lab to Land programme actively participated in the seminar. Discussions were led by experts from the Kerala Agricultural University.

Visitors

Dr. Kishan Singh, Director, IISR, Lucknow visited the station from 8-6-1984 to 10-6-1984 and on 11-6-1984, a lecture was arranged for the benefit of the staff and students of Agricultural College, Vellayani by him on red rot menace of sugarcane.

Dr. K. C. Alexander, S4 Scientist, SBI, Coimbatore visited the station on 12-6-1984 to 13-6-1984 and 22-10-1984 to 23-10-1984 for surveying the diseased area and to do the red rot inoculation work.

1.22 RICE RESEARCH STATION, KAYAMKULAM

Rice Research Station, Kayamkulam is located at Kayamkulam in Alleppey district 1 km. east at Kayamkulam town on the northern side of Kayamkulam-Punalur road, at 9 10'' N latitude and 76°3'' E longitude at 3.05 m above MSL. The station was established in 1937 under the Kerala University and later transferred to the State Department of Agriculture in May, 1958. It was transferred to Kerala Agricultural University with effect from 1st February, 1972. An area of 9.45 ha of wet land and 2.20 ha of garden land was acquired during 1973. Short duration varieties of rice are generally grown during virippu season and medium to long duration varieties of rice during mundakan season. During January-April summer crops of sesamum, pulses or groundnut are raised as catch crops. The soil is sandy loam.

The aim of the station is to evolve high yielding varieties of rice and sesamum resistant to pests and diseases suitable to Onattukara tract and to standardise agro-technique for Onattukara region. The overall improvement of major crops in Onattukara region is the objective of all research projects. This region comprises an area of 68340 ha in the Districts of Alleppey and Quilon. In 1981 this station has been declared as a sub-centre for conducting research on Root (wilt) disease of coconut. Besides in 1982 this station has become a part of NARP to tackle problem peculiar to Onattukara Tract.

Sri. K. Balakrishna Pillai, Associate Professor (Entomology) continued to be in charge of the station during the period.

Smt. S. Santhakumari, Associate Professor (Botany) attended the Annual Workshop of All India Co-ordinated Project on Oilseeds held at Coimbatore during April, 1984.

Sri. K. Balakrishna Pillai, Associate Professor (Entomology) attended the workshop on Farm Trials, held by the World Bank officials of Directorate of Extension, Mannuthy.

Total number of Research projects as on 31-3-1985 was 26.

Extension Activities

Project on intensification of Research and training on Pulses and Oilseeds:

This ICAR project was functioning at this centre from 1.10.1979 and continuance sanction was accorded to this scheme by ICAR upto 31-3-1984. This scheme was however continued upto 30-6-84 with the financial assistance of Kerala Agricultural University.

Six one day off campus trainings were conducted to Agricultural Demonstrators of Alleppey, Quilon and Chengannur Sub divisions in the Production Technology of Pulses and Oil seed. 125 Demonstrators attended the trainings.

Conducted 3 classes on Nutrition Education to Agricultural Demonstrators and 9 classes to Balawadi teachers of Kayamkulam and Shertalai Municipality 75 Demonstrators 50 teachers and 120 mothers attended the same

20 Demonstrations in cultivators fields were conducted to popularise Sesamum cultivation

Lab to Land Programme

Twenty five families were selected in the Keerikkad Village and Bench Mark survey was conducted To the beneficiaries the following inputs were supplied

Pullets	113 nos
Cattle feed	1620 kg
Poultry feed	700 kg
Vegetable seeds	500 g
Coconut seedlings	100 nos
Cages for poultry	25 nos
Fertilisers	400
Implement (Spade, Harrow etc)	100 nos
Weaving materials (Screw-pine, coconut leaves)	107 bundles
Feeding trays	25 nos
Plastic buckets	25 nos.

Three one-day Seminars were conducted in the adopted Village and One Agricultural Seminar at this station in connection with the Farmers Day Celebrations in March 1985. These seminars were attended by a large number of cultivators.

A Krishi Darsan Programme was conducted in March 1985 and 100 farmers attended.

An Agro-clinic was opened at Keerikkad, frequent visits were conducted by the Scientists of this station and suggested proper remedial measures to the problems raised by the cultivators who were present in the clinic during each visit.

Under village adoption scheme, the following inputs were supplied to the cultivators and conducted demonstration to popularise improved methods of cultivation.

Sesamum seed	:	7.5 kg
Cowpea	:	6 kg.
Urea	:	110 kg.
MOP	:	85 kg.
M Phos	:	150 kg.

Control campaign was conducted at Keerikkad in a small area and 15 tubes of Celphos were distributed.

Four batches of Agricultural Demonstrators (145 nos) and 5 batches of Junior Agricultural Officers (89 nos) of the Agricultural Department were given training on Pulses and Oilseeds cultivation, and 1 batch of Agricultural demonstrators (42 nos) was given Rice Production Technology Training.

Visitors

Dr. Appa Rao (World Bank) visited the station and inspected the NARP work in May 1984.

Research Highlights

RICE

Crop Improvement

Comparative Yield Trial of Photosensitive cultures suited to 2nd crop season on Onattukara (Rice Research Station, Kayamkulam)

It was found that Culture 1423-5 of cross PTB-4 x TR-17, 1358-2 of Cross Jaya x PTB-4 and 1336-3 of Cross Jaya x PTB-20 have given significantly higher yield (5385.6, 5172.12 and 4829.73 kg/ha respectively) of grain and superior to all other cultures as well as standards from the hybrid cultures evolved at the Station.

These three cultures were promoted for farm trials in Alleppey and Quilon districts.

Breeding varieties resistant/tolerant to salinity and flood for Orumundakan Area

During the period under report, the following varieties/cultures were collected from IRRI, Philippines.

1.	IR 9384-54-3	3.	FR 13 A	5.	IR-50	7.	CSR-1
2.	IR-46	4.	CSR-2	6.	IR-36	8.	IR-42

These varieties will be tested for salt tolerance in the Orumundakan lands and breeding will be done in 1985-86.

Breeding varieties tolerant/resistant to Sheath Blight

Almost all the varieties recommended for cultivation during the 1st crop season in Onattukara are susceptible to Sheath blight. Hence 5 sheath blight tolerant varieties were collected for screening.

SESAMUM

Co-ordinated varietal trials on various aspects of Sesamum and Oilseed.

To study the performance of varieties of sesamum evolved from various research centres in India under the conditions of Onattukara, a study on these lines was conducted during the 3rd crop season.

In the initial preliminary trial 30 varieties of sesamum were tested. Of the tested varieties the performance of RAU-5, TA was found excellent in respect of yield of both grain

In the co-ordinated varietal trial in which 17 entries were tested Kayamkulam-1 a variety evolved and released from the Rice Research Station, Kayamkulam gave 858 kg ha grain yield and proved to be superior to all other test varieties

In the National Elite Trial 8 pre-release cultures evolved at various research stations in India were tested along with Thilothama and Kayamkulam-1 released from the Kayamkulam Rice Research Station. Of the varieties and cultures tested C-7 and Kayamkulam-1 gave significantly higher yield (1566.30 and 1471.08 kg/ha grain ha respectively) compared to other test entries

Semi rabi Trial with promising varieties and cultures of sesamum

An adaptability trial with 5 cultures and 7 varieties of sesamum including Thilothama and Kayamkulam-1 were conducted and it was found that the varieties Gowri and Kalika are well suited to Garden Land cultivation for semi rabi season (Gowri-1232 kg grain ha, Kalika-1005 kg grain ha)

Evolving short duration varieties of Groundnut suited to rice fallows of Onattukara by selection and mutation breeding

During the year under report, 32 varieties supplied by ICRISAT and 16 varieties obtained from other stations were screened

Crop Management

RICE

Permanent Manurial Trial

The project was started in 1964 and the experiment is repeated in both seasons every year.

The result indicates that as far as yield is concerned, maximum yield was recorded by plots that received 80 kg Nitrogen per hectare (60 kg Nitrogen as Ammonium Sulphate and 20 kg Nitrogen as cattle manure) along with 40 kg each of Phosphorus and Potash per acre as Superphosphate and Potash, in both seasons. In the Second crop season the plots that received 80 kg N, 40 kg P_2O_5 and 40 kg K_2O (as fertilisers) per hectare also gave an yield equal to that gave by the aforementioned doses. Similarly, the results also indicated that continuous application of nitrogenous fertilisers without phosphatic or potassic fertilisers is deleterious for rice growth and that the application of P_2O_5 and K_2O in soil is found essential for higher yields

The current years results confirmed the results of the previous years.

SESAMUM

Chemical control in sesamum

To study the effect of application of pre-emergent weedicide "Alachlor" to control the weeds in sesamum crop a project was

undertaken and the experiment was conducted in 1981 and it was repeated every year upto 1985, third crop season.

In all the seasons, Alachlor @ 0.75 kg/ha gave maximum control of weeds. The cost benefit aspects were also studied in this experiment. It was also found that maximum profit per hectare was obtained from plots where Alachlor was sprayed @ 0.75 kgai/ha eventhough the maximum yield was obtained from plots where handweeding was resorted for control of weeds.

Effect of soil dusting on leaves, on the growth and yield of sesamum

Among the cultivators, there is a notion that by dusting soil in situ on the leaves of young sesamum plants during early morning, the growth and yield can be increased. They often practice this method also. How far this statement is true is studied in this project. Three frequency of soil dusting (once in alternate days, once in three days and once in a week), and four times of soil dusting (at 6 am, 8 am, 10 am and 12 noon) were tried. To compare these treatments, another treatment of 2% urea spray was also included.

The results revealed that maximum yield was obtained in plots treated with urea spray and this yield was on par with those treated with soil in alternate days either at 6 am, 8 am or 10 am and with those treated once in three days at 8 am.

COCONUT

Response of diseased and apparently healthy coconut palms to fertiliser levels and organic manuring.

As far as yield is concerned, in apparently healthy palms a general increase in yield of nuts over pre treatment yield was observed in all the treatments.

An increase in yield over pre- treatment yield was observed in all treatments under disease affected palms. Yield increase ranged from 7.44 nuts/tree in control to 12.31 nuts/tree.

In healthy as well as diseased palm, yield increase was maximum in higher fertiliser levels.

With regard to disease index no significant difference was noted between treatments. In apparently healthy palms slight increase in disease index was noted. Similarly in the case of diseased palms there was no reduction in index was observed.

Effect of intercropping fodder legumes and grasses in coconut garden on the incidence and severity of the Root (wilt) disease of coconut

Maximum yield though not significant statistically was given by plots where Cowpea was grown (9 nuts/tree) compared to that of the control plot where the yield was 7.91 nuts per tree.

As far as disease index is concerned the trend observed was a general reduction In guinea grass grown plots maximum reduction was observed

Effect of growing and incorporation of different green manure crops and its influence on apparently healthy and diseased coconut palms

In disease affected as well as apparently healthy palms an increase in yield of nuts was visible in green manured trees

Similarly, a reduction in disease index was shown by green manured diseased trees while in apparently healthy palms green manured trees showed an increase in disease index compared to pre-treatment disease index

Plant Protection

SESAMUM

Diseases of Sesamum

Leaf spot disease was noticed in serious form during last year In an observational trial conducted during the year under report, several fungicides both for seed treatment, and for spraying on plants were tried to find out their efficacy in controlling the disease and it was observed that Bordeaux mixture 1% spray is highly effective in controlling the leaf spot disease

COCONUT

Control of leaf rot disease using newer non-systemic fungicide

In the leaf rot affected palms, a gradual decrease in disease index was noted in all the fungicides sprayed palms whereas in control palms an increase in disease intensity was noted

Among the diseased trees, Bordeaux mixture 1% sprayed trees showed maximum reduction in disease index Maximum increase in disease index (19.3%) was shown by untreated disease trees (Control)

Phytotoxic effect of insecticides on rice

With the objective to study whether the insecticides carbofuran phorate and monocrotophos have phytotoxic effect on growth and yield of rice, four doses were tested at different intervals

The results of the experiment so far conducted in the past years indicate that the chemicals tried have no phytotoxic effect at the doses applied. This years results are also in full agreement with the previous years result

1.23 NATIONAL DEMONSTRATION SCHEME, SADANANDAPURAM, QUILON DIST.

The National Demonstration Project, a nation wide programme of demonstration started during 1964 for the transfer of technology

from the scientists to the farming community. Kerala Agricultural University started implementing this scheme since 1975 with the specific objective of transfer of technology to achieve maximum production and net returns per unit area of land per unit time.

ND scheme at Trichur district was shifted to Quilon district on 1-6-1983 with headquarters at Sadandapuram, 5 km away from Kottarakara in the Kottarakara-Trivandrum route.

Major objectives

To demonstrate convincingly to farmers the production potentialities of unit area of land.

To demonstrate use of improved implements for different operations and use of soil testing labs for balanced use of fertilisers.

To train the farmers in improved cultivation practices.

To provide the research workers a first hand knowledge of the problems faced by farmers and

To minimise the time lag between the research generated and its application in the fields

Research projects

Demonstration programmes. During the year 1984-85, twenty demonstrations were conducted in farmers field at various locations in Quilon district.

Highlights

Popularisation of HYV of paddy for the first and second crop season

Two varieties of paddy Lakshmi and Cul-25100 which are proved to be high yielding are being popularised in the tract

Improved varieties of tapioca Sreesahya and Sreevisakh are popularised.

Liming is demonstrated to farmers

Adopting recommended dose of fertilisers as per package of practices

Demonstrating homestead development.

Advantage of improved poultry breeds demonstrated to farmers.

Demonstrated the technology of application of Neem cake as nitrification retardant

Field days were conducted in 23 places, altogether 396 farmers took part in the discussions.

One day Kisan Mela was conducted at Sadanandapuram on 20-3-1985. One hundred and fifty farmers attended the mela.

Visitors

Dr V. Veerabhadriah, Regional Co-ordinator, ND scheme (Southern Region) visited the scheme on 21st and 22nd November 1984.

Other items

District Advisory Committee for ND Scheme, Quilon district was convened on 28.2.1985 at Sadanandapuram.

The State Advisory Committee of the ND Scheme was convened on 6.5.85 at Agricultural College, Vellayani and finalised the technical programme for 1985-86.

The scientists of the scheme attended the NARP (SR) workshop at Vellayani on [illegible] September 1984 and the [illegible] Zonal workshop at [illegible] May 1985.

The Subject Matter Specialist [illegible] Professor (PP), Asst. Professor (SS) [illegible] working under the ND Scheme [illegible] Subject Matter [illegible] the Southern Region [illegible] Bangalore from 7th August to [illegible] August 1984.

The Assistant Professor [illegible] attending the T & V monthly workshops of Quilon [illegible].

Lab to Land programme was [illegible] by the scheme staff at Kottarakara.

[illegible] 24 CROPPING SYSTEMS RESEARCH CENTRE, KARAMANA

This station was established in 1955. The station is situated at Nedumcaud, Karamana, 3 km South East of Trivandrum Central Railway Station.

Area	The area of the station is 7.65 ha, with	
	double cropped wetland	7.25 ha
	and garden land	0.40 ha

It is the major centre of All India Co-ordinated Agronomic Research Project and also functions as main centre of this Project. In addition to the Agronomic Projects of the AICRP Scheme some Kerala Agricultural University experiments are also being conducted here. It also meets the requirement of farmers for seed of High Yielding Varieties.

This centre named previously as the Model Agronomic Research Station was established in the year 1955 with main objective of conducting simple fertiliser and soil fertility projects. New schemes and experiments were started from 1968 onwards under the All India Co-ordinated Agronomic Research Project from October 1983 onwards. This station has been upgraded as the Headquarters of AICARP Scheme in Kerala. There are two sub centres viz. Experiments on cultivators field at Quilon district and at Palghat district.

Dr. E Thajudeen. Professor continued to be in charge of the scheme.

Field training for the Agricultural Demonstrators of T & V programme was conducted in this station from 8-10-1984 to 24-11-1984 in seven batches Totally seventy eight (78) trainees attended this training.

A Kisan Mela was organised as part of Lab-to-Land programme. Ninety two farmers participated in the Kisan Mela. It was inaugurated by Dr. N. Mohanakumaran. Associate Director (NARP), Southern Region. Farmers' questions were answered by various subject matter specialists.

Details of seminar workshop attended by staff members

Sri S M Shahul Hameed, Asst. Professor. Sri Yageen Thomas, Asst Professor, attended the training programme conducted by Sri. Bhargava, Statistician, IASRI, New Delhi at Trichur on 15-6-1984 and 16-6-1984.

Dr. E. Thajuddin Professor of Agronomy attended the annual workshop of All India Co-ordinated Agronomic Research Project at Jaipur on August 27th to 29th 1984

Sri Devanesan, Jr Asst Professor and Sri. Yageen Thomas, Asst. Professor attended NARP zonal meeting at Vellayani on 12-9-84 and 13-9-84

Sri S M Shahul Hameed, Sri Devanesan, Jr. Asst. Professor and Sri Sam T Kurumthottical attended Audio Visual Training at College of Agriculture, Vellayani on 14-1-1985 to 17-1-1985

Experiment details of Cropping Systems Research Centre, Karamana during 1984 85

Experiment No 1 (b)

Crop technology for optimum production under resource constraints with the objective to find out suitable package of practices for rationalisation of inputs usage for higher returns in crop sequences. Rice Rice crop sequence was followed The experiment was started during 1984-85 Kharif and repeated in Rabi in the same lay out The yield data has been sent to Indian Agricultural Statistical Research Institute

Experiment 3

Long range effect of continuous cropping and manuring on soil fertility and yield stability

Objective

To study the long range effect of selected crop sequences with high yielding varieties at graded fertiliser levels on the yield stability and soil fertility

This experiment was started during 1977-78 Kharif and is proposed for 10 years. It is being continued in the same lay out plan with the same set of treatments. During Kharif and Rabi 1984-85 this experiment was conducted in the same lay out.

Experiment No. 9

Slow release fertilisers and nitrification inhibitors

The objective is to study the relative efficiency of slow release nitrogen fertilisers for low land rice and its residual effect on the succeeding crop of rice or wheat.

Experiment No. 4 (Modified)

Agronomic evaluation of new promising newly released varieties/hybrids of crops, with the objective to study the performance of new released varieties in relation to date of sowing/planting, as well as varying nutrient.

This experiment was started at this centre from 1983-84 Kharif season. The same varieties were used for this experiment and it was laid out in a fresh site.

Experiment 12 (a) Weed control studies in crop sequence

This experiment was started during Kharif 1982-83 with the objective to study the long term effect of chemical and manual weed control methods in crop sequence.

The experiment was started from 1982-83 Kharif season. It was conducted during Kharif and Rabi season of 1984-85. Saturn @ 1.5 kg ai/ha was used as herbicide. The data is being analysed.

KAU Projects

District trials with semi tall cultures of Rice

Agronomic evaluation of three semi tall cultures of rice evolved at Rice Research Station, Moncompu along with check varieties.

The experiment was successfully completed during Kharif and Rabi 1984-85. The experimental data is being analysed.

Observational trial

Studies on the economics of rice bug control

Objective is to find out the suitable quantity of insecticide and volume of spray fluid required to control the rice bug in order to save the cost of plant protection.

The crop harvested and yield of individual plot recorded.

Experiments on cultivators field

Two ECF Units are functioning under AICARP Scheme of Kerala State, one at Palghat with Headquarters at Regional Agricultural Research Station, Pattambi and other at Quilon.

Experiment Type N_1

Studies on rationalisation of inputs in crop under assured rainfall

This experiment was conducted at ECF Palghat only during Rabi 1984-85. 25 trials were successfully completed in this unit.

Experiment Type N_2

Testing of rock phosphate in acid soils in rice based crop sequences

This experiment will be repeated at the same site during both Kharif and Rabi seasons. Such trials were conducted at ECF Quilon district only. Sixteen trials were conducted during Kharif and Rabi seasons of 1984-85. Data collected has been forwarded to IASRI New Delhi for final analysis.

Experiment Type B

Comparative performance of newly released and locally popular/ recommended crop varieties of cereals and their fertiliser requirement under assured rainfall conditions.

This experiment was conducted at ECF Quilon only during Rabi 1984-85. Twenty nine trials were successfully completed in this unit.

Experiment Type D

Fertiliser requirement of legumes in dry lands

This experiment has been conducted only at ECF Quilon during the Summer season and 24 trials were initiated.

Experiment Type E

Fertiliser requirement of soil seeds excluding groundnut under dryland conditions

This experiment was conducted at both districts Quilon and Palghat during the summer season.

In ECF Palghat 16 trials were successfully completed and in Quilon 24 trials were initiated and the yield data of this experiment has not reached this office so far for sending the data to IASRI New Delhi for final analysis

1.25 NATIONAL AGRICULTURAL RESEARCH PROJECT (SOUTHERN REGION), VELLAYANI

The National Agricultural Research Project (NARP) for the Southern Region, Kerala started functioning in February, 1982, with the establishment of a Regional Agricultural Research Station at the College of Agriculture, Vellayani. The project has been formulated by the Indian Council of Agricultural Research, with the assistance provided by the International Development Agency (IDA) for a period of five years. The southern region covers the districts of Trivandrum, Quilon, Pathanam thitta, Alleppey and Kottayam, except for the high ranges and the

problem areas such as the coastal saline tracts, Onattukara sandy soils and the problem soils of Kuttanadu for which separate NARP sub projects have been implemented. The establishment of a sub station at Kottarakkara to tackle the specific field problems of homestead farming is also proposed under the project.

Major objectives

Multi disciplinary research on various farming situations for the integrated development of the region aimed at maximum farm productivity and net income of the farmers particularly the small and marginal farmers, is the major objective of this sub project.

The specific objectives include the following:

To formulate and undertake research on tuber crops and other tuber and on homestead farming systems in the field farms of the Regional Station at Vellayani and the Special Station at Kottarakkara respectively.

To supervise and co-ordinate research work at the Regional Station and the Special Station.

To conduct Regional Workshops for each planting season (Kharif and Rabi) and to establish an effective institutional net work for ensuring feed back between the scientists and the extension personnel.

To adopt two or three villages so that the scientists themselves can work with the farmers, study the constraints and find out remedial measures to overcome the constraints.

To undertake limited field extension activities through participation in field work, training, Kisan Mela etc., thus making research more purposeful and transfer of technology more rapid.

To maintain a catalogue of problems referred to by the extension personnel and the farmers and those observed by the scientists during their field visits, and

To take part in the training of the extension personnel working in the T & V system of Agricultural Extension.

Developments during the year

The fifth and sixth Zonal Workshops of the NARP (Southern Region) and the KAEP were held at Vellayani on 12th and 13th September, 1984 and on 26th and 27th March, 1985 respectively. The progress of the project made till then was reviewed and research programmes for Rabi 1984 and Kharif 1985 respectively were finalised during these two workshops.

The various research projects which were being implemented on priority basis, were categorised under the following four main farming systems currently practiced by the farmers of the region, viz.,

Homestead farming system
Tapioca based farming system
Coconut based farming system
Rice based farming system

The technical programme for the year under report included 57 research projects under the four main farming systems mentioned above. In addition, two research projects under the utilisation of soil survey information for productivity and land use purposes and one project for the data bank in Agricultural sector for the Southern Region were also included, thus totalling the ongoing research projects to 60.

Equipment procured

The imported items of equipment, viz., Research Microscope, Atomic Absorption Spectrophotometer, Area Meter, High Speed Centrifuge and Quantum Radiometer/Photometer were commissioned during the year under report.

The Central Instrumentation Laboratory wherein costly and imported items of research equipment procured under NARP are installed, catered to the research needs of the staff and P G. students working in the different departments in the College. All the instruments in this laboratory functioned well.

Civil work

Remodelling work of the laboratories of the departments in the College viz. Horticulture, Agri. Entomology, Plant Breeding, Plant Pathology and Food Science and Nutrition was carried out, in addition to that of the Department of Agronomy and Soil Science & Agricultural Chemistry. The remodelling was carried out to strengthen these research departments.

Glass house and Green house

One glass house (75m) and one green house (25m) were completed during the year.

Reclamation of Kayal lands

The sites for the 'reclamation of Kayal lands' and for the 'development of additional garden land' were selected and the estimates for the work were under preparation.

Acquisition of land for the Special Station at Kottarakkara

An area of 10.10 ha has been proposed at Sadanandapuram, 5 km south of Kottarakkara for starting the Special Station. Acquisition proceedings were initiated during the year.

Dr N. Mohankumaran, Associate Director continued to be in charge of the southern region.

Smt. Annamma George, Assistant Professor of Agronomy entered on leave for study purposes (from 17-4-84). Smt. Sobhana joined the project as Junior Assistant Professor (against the post of Assistant Professor of Agronomy) on 12-9-84.

One post of Assistant Professor of Agronomy was vacant from 17-4-84 onwards and the other one from 11-9-84.

Smt. Annamma George, Assistant Professor, Agronomy was granted study leave for a period of 24 months and she joined for the Ph.D. course at Vellayani on 17-4-1984.

The Zonal Workshops of the NARP and KAEP for the Southern Region were conducted at Vellayani on 12th and 13th September 1984 and on 24th and 25th May 1985 respectively.

Fifteen scientists were trained at Vellayani from 21-1-85 to 25-1-85 on the use of the soil and plant related instruments available in the Central Instruments Laboratory established under NARP (SR).

The scientists under the NARP (SR) participated in V and VI Zonal Workshops of the NARP (SR) and KAEP held at Vellayani and presented the progress report of the projects handled by them.

Dr. N. Mohanakumaran, Associate Director participated in the V Zonal Workshops of the Region of Problem Areas (23rd & 24th April 84) and the Central Region (17th & 18th August 84). Sri. P. R. Ramasubramonian participated in the VI Zonal Workshops of the above two regions on 5th & 6th March 85 and on 1st and 2nd February 85, respectively. Sri. M. K. Mammen participated in the Zonal Workshop for the High Ranges on 22nd February 85.

Dr. N. Mohanakumaran, Associate Director attended the State Level Technical Committee meeting at Trivandrum on 11-4-84 and on 6-11-84. He also attended the meeting of the Zonal Associate Directors of NARP held at Vellanikkara on 30th and 31st December, 1984.

Dr. N. Mohanakumaran, Associate Director and Sri. P. R. Ramasubramonian, Associate Professor of Soil Science participated in the meeting convened on 28-5-84 at Mannuthy to discuss "Forestry Education" and also in the Seminar on "KAU 2000 AD" held at Vellanikkara on 22nd to 24th November, 1984. Dr. N. Mohanakumaran presented a paper on "Research to meet the challenges of 2000 AD" during the Seminar.

Dr. P. Manikantan Nair, Associate Professor of Plant Breeding continued to serve as resource person for the T & V Workshops for Trivandrum district during the year under report.

Dr. N. Mohanakumaran, Associate Director participated in the 'Mini Package Workshop' at Vellanikkara on 23-1-1985. He also attended the 'Workshop on Farm Trials' held at Vellanikkara on 12th to 14th December, 1984.

Sri. P. R. Ramasubramonian, Associate Professor of Soil Science participated in the V Annual Workshop of the All India Co-ordinated Project of Tribal Area Research (ICAR) held at Trivandrum on 18th to 22nd February 1985. He also participated in the Rice Day celebrated by the RRS, Moncompu on 4-3-85.

Dr. P. Manikantan Nair, Associate Professor of Plant Breeding participated in the Seminar on "Preservation and Food Adulteration" organised by the Association of Food Scientists at Trivandrum on 8-2-1985.

Sri. Abdul Hameed and Dr. (Mrs) P. Saraswathy, Associate Professors of Soil Science and Statistics, respectively underwent an inservice training on 'Audio-visual Aids and Communication Media' organised by the Department of Agricultural Extension, College of Agriculture, Vellayani on 14th to 19th January, 1985.

Sri R. Balakrishnan Asan, Assistant Professor of Statistics attended the VI Annual Conference of the Indian Society for Theory of probability and its applications held at Trivandrum on 27th to 29th December 1984 and presented two papers.

Smt S. Shylaja, Assistant Professor of Agrl. Extension participated in the Regional Workshop on 'Developmental Communication' held at Vellayani on 3th to 10th January, 1935.

The senior technical staff of the NARP (SR) handled classes for various short term training courses conducted at the College of Agriculture, Vellayani.

Dr. N. Mohanakumaran, Associate Director participated in the 'Kisan Mela and Agricultural Seminar' organised by the National Demonstration Scheme at Sadanandapuram on 20-3-85. He inaugurated the 'Agricultural Seminar' organised by the Cropping System Research Centre, Karamana on 28-3-85.

New area acquired

Acquisition proceedings for acquiring 10.19 ha of land at Sadanandapuram, near Kottarakkara to start a sub station of NARP (SR) were initiated.

Information centre

An information centre established for highlighting the activities and achievements of the NARP (SR), continued to function during the year under report. New specimens and charts were included to strengthen the information centre.

An extension lecture on "Advances in Vegetable Research" by Dr. B. Choudhury, Head, Division of vegetable crops, IARI, New Delhi was organised on 7.1.1985.

Number of research projects as on 31.3.1985 was 57 under NARP. Four projects were concluded during the year. 8 projects under rice, 2 projects under coconut, arecanut and oil palms, 4 projects under fruit crops and flori-culture, seventeen projects under vegetables and tubers, 2 projects under pulses and oil seeds, one under soils and agronomy, 5 projects under farm economics, extension and statistics and 15 projects under plant protection group were sanctioned and implemented during the year.

Research Highlights

In the "Studies on the selection of superior types of *Capsicum annuum* with economic attributes from the segregating generation of the intervarietal crosses" three cultures, viz. Cul-57, Cul-33 and Cul-47 were found superior. These cultures have been recommended for farm trials.

Studies on the control of sheath blight and sheath rot diseases of rice in disease-endemic areas confirmed that application of carbofuran @ 1 kg a.i./ha at 25th day after transplantation followed by 50 per cent more of potash over and above the normal recommended dose, could reduce sheath blight and sheath rot incidences or their severity. The above practice was found to increase in its efficacy when combined with foliar spray of the fungicide Vitavax at the critical stages (boot leaf and earhead stages) of growth.

In an attempt to identify suitable varieties of companion crops to tapioca, it was found that cowpea variety V-26 was found superior and was followed by New Era and HG-22. Among the groundnut varieties tried, TMV-2 was found to have the highest pod yield and was followed by Big Japan. The tuber yield was found maximum where TMV-9 was grown as companion crop, followed by TMV-2.

Attempts for the mass multiplication of mycorrhizal fungi from the roots of cassava varieties have been initiated. These mycorrhizae are efficient in solubilising phosphorus in soils.

Cowpea variety V-59 was found promising and suitable for the southern region for the summer rice fallows.

Studies on the efficacy of the different granular nematicides for the control of root-knot nematode of bhindi revealed that Temik, Furadan and Thimet were on par and effective in controlling the nematode and thereby increasing the yield of bhindi.

Varietal evaluation for guinea grass under the open condition was attempted. Twelve cuttings were taken. The variety FR-600 gave the highest green fodder yield (7.18 kg), followed by Mackuenii (5.54 kg) and FR-552 (5.2 kg).

Similar studies on guinea grass under partially shaded condition in coconut gardens have been initiated.

Field trials at Uzhamalackal to study the control of pollu beetle of pepper indicated that the spike and berry infestation was least in the endosulfan 0.05 per cent treated vines. Yield was also highest.

The waiting periods for fenitrothion, quinalphos and malathion were 3 to 4 days both for rainy season and dry season in the washed and unwashed bitter gourd fruits. For carbaryl, it was eight days for washed and 9 to 11 days for unwashed bitter gourd fruits in the two seasons.

Work carried out on the size of earthen pots and the composition of potting mixtures, for growing vegetables on the terrace of buildings indicated that a combination of pot size 45 x 30 cm and potting mixture of cowdung, red earth and sand in the ratio 2:1:1 resulted in the maximum yield of brinjal, tomato and bhindi, followed by a combination of 30 x 30 cm pot size and 1:2:1 potting mixture.

Studies were carried out for the improvement of bee keeping practices in homesteads.

Research reports of each project

RICE

Screening of rice varieties, cultures for tolerance resistance to brown plant hopper, sheath blight and yield potential

The objective is to identify rice varieties and pre-release cultures for tolerance/resistance to BPH, sheath blight coupled with high yield potential.

Stem borer incidence was highest in TKM-9 (36.23%). Culture-52-3-6, Jaya, Culture-1954, Culture-4 and IR 50 recorded comparatively low incidence. No sheath blight was noticed for Culture-1537-2 (Karthika), Varieties/Cultures viz. Jaya, Culture-1954, MO 5, IR 50, Culture-126, M-210 and Culture-44 had low scores for sheath blight, whereas Cul 43-1-4, Cul 52-3-6, Jyothi, M-2 etc., had high scores showing their susceptibility. Sheath rot incidence score was low in IR 50, Cul 4-4, MO 5 and Cul 26-1-1 whereas Cul 43-1-4 and Cul-25337 had high disease scores showing high susceptibility. The grain yield was high in Cul 169 (5052 kg/ha) followed by Cul 126 (4193 kg/ha) and Jyothi (4331 kg/ha). No BPH incidence was noticed.

The previous year result indicated the highest incidence of sheath blight in the variety Jyothi while Jaya recorded the minimum intensity of blight. In the variety Jyothi, highest incidence was observed in MO-5. As regards sheath rot, highest incidence was observed in MO-5. Jaya, Cul 1954, Cul 129, Cul 25331, and Cul 4 recorded no incidence of the disease. The experiment will be repeated during Kharif 1985.

Effect of indigenous sources of soil ameliorants and organic wastes in reducing iron toxicity in the acid rice soils

The objective is to compare the effects of incorporation of cheaper and indigenous sources of soil ameliorants and organic wastes in reducing iron toxicity to rice in the acid wetland soils. The experiment which was carried out during the Rabi season of 1983-84, was repeated during 84-85 at the Instructional Farm, Vellayani with an additional treatment of rice husk at the rate of 5,00 kg/ha. Since sufficient irrigation and submergence could not be maintained due to want of water for irrigation, the crop had to grow under drought conditions. The experiment got vitiated.

Phosphorus management in a rice based cropping system

The objectives are to find out the possibilities of skipping 'P' application in any one of the rice seasons in a rice-rice-legume non-legume cropping system, to assess the residual effect of 'P' application, to find out a suitable management in such a rice based cropping system to assess the extent of 'P' fixation and to work out the economics of the different treatments.

A field experiment in RBD was carried out at Vellayani with rice-rice-legume non-legume included in the Virippu, Mundakan and Summer seasons respectively of the year. Harvesting of the first crop (Virippu) paddy and second crop (Mundakan) paddy were completed and the statistical analysis is in progress. Harvesting of the third crop (cowpea and sesamum) was started.

Adaptability of rice Culture 24-20 for the southern region

The objective is to find out the adaptability of rice Culture 24-20 for the southern region.

A field experiment was carried out in a farmer's field at Vellayani Kayal area during the 3rd crop season of 84-85, using Cul-24-20 and a check Annapoorna. The experiment was vitiated on account of severe water stress in the area after the active tillering stage. The experiment will be repeated during 1985-86.

Concluded Projects

Effect of increased potash, soil application of micronutrient and nematicide along with foliar spray of fungicide in the control of sheath blight and sheath rot diseases of rice (Multi locational trial)

This experiment has been concluded. Since the application of fungicides alone often fails to control sheath blight and sheath rot diseases of rice in endemic areas of the State an approach with an integrated crop management practices is to be tried in the field for their effective and economical control.

A multi locational field trial was conducted, one at CSRC, Karamana and another in Adoor in a farmer's field. The rice variety used was Triveni.

The following conclusions were drawn:

Application of carbofuran (Furadan @ 1 kg ai/ha at 25th day after transplanting) as an insecticidal/nematicidal treatment could reduce sheath blight and sheath rot incidences and their severity.

Application of 50% more of potash over and above the normal recommended dose is effective in reducing the severity of both the diseases economically.

The above two practices are found to increase their efficiency when they are combined with foliar spray of the fungicide Vitavax (carboxin) at the critical stages of the crop growth viz. boot leaf and earhead stages) both in decreasing the disease severity and in enhancing the yield.

The carbofuran residue of treated plots was found to be negligible.

Whenever sheath blight and sheath rot diseases of rice are endemic and occur in severe forms and where the soil shows a severe root nematode population and other past incidences like that of leaf roller, stem borer etc., the carbofuran treatment at the rate of 1 kg ai/ha will defenitely check the diseases and enhance the yield.

Ongoing Projects

Chemical control of rice stem borer in endemic areas

The objective is to test the feasibility of application of insecticides as a prophylatic measure and further application on need basis against rice stem borer in endemic areas.

The results indicated that the prophylatic application of a granular insecticide followed by a need based spray is useful for the control of stem borer and gall fly.

Application of Furadan or Ekalux granules followed by Nuvacron or Lebacid sprays gave good results in controlling stem borer at the vegetative phase and reproductive phase of the rice crop.

COCONUT, ARECANUT AND OIL PALM

Control of Rhinoceros beetle in homesteads

The objective is to evaluate the extent to which the application of soil insecticides in the bottom of manure pits will control the pest. The experiment was laid out at Chirayinkil, Perinthalmanna and Vellayani. The treatments were Aldrin 30 EC 0.12 kg ai/ha, BHC 50%, WP 0.06 kg ai/ha and control. Pits of size 1 m × 1 m × 1 m were taken in these localities during February-March and treated with the insecticides at the

bottom to a depth of 15 cm. Coverdung was heaped over the soil and grubs were released @ 10 grubs pit. These pits after releasing the grubs were covered with wire net. The work is in progress.

Investigations on the etiology of root (wilt) disease of coconut

The objective is to conduct electrophoresis of extracts from diseased and healthy coconut palms to find out whether there is any indication of the presence of deformed nucleic acids in diseased palms. As suggested by Dr. Randles who had done similar type of work of Cadang-Cadang disease of Coconut, electrophoresis was done with the sap from the diseased and healthy herbaceous plants. So far, clear development of distinct bands could not be obtained. The experiment is being repeated to get the techniques perfected.

FRUIT CROPS AND FLORICULTURE

Studies on Red Banana

Flower initiation and fruit development studies in Red Banana

The objective is to find out the actual time of flower initiation in Red banana.

Fifty suckers of uniform age were planted at the Instructional Farm, Vellayani. From the 5th month of planting, 4 plants were uprooted at random and dissected out to locate the apical meristem. The meristems are being preserved in fixative agent for taking sections using microtome and thereby observe and locate the flower primordia. This observation will be repeated at 15 day intervals and will be continued upto shooting. The rhizome samples are collected for finding out the C/N ratio at the time of uprooting.

Studies on Red Banana

Nutritional requirement of Red Banana under rainfed conditions

The objective is to formulate and recommend a fertiliser schedule for the variety Red Banana.

The experiment has been laid out with treatments of NPK 140:140:280, 160:160:329, 180:180:360, 200:200:400 and 220:220:440 g/plant. In addition to the above, NPK at 370:40:380 g/plant as recommended for Kanyakumari District of Tamil Nadu is also being tried for comparison. Basal applications of wood ash @ 2 kg/pit before planting, cattle manure at the rate of 10 kg/plant 1 month after planting were also done. NPK fertilisers were applied in splits at 2nd, 4th, 6th and 8th month after planting.

The experiment is in progress.

Plant Protection

Studies on the control of bunchy top disease of banana by cross protection with mild strains of the virus

The objectives are to identify the mild strains of bunchy top virus from disease affected area and using the same for cross protection studies and to induce the production of mild strains of bunchy top virus by gamma irradiation.

During 83-84 a survey to locate the presence of mild strains of bunchy top virus was conducted. The aphid vector *Pentalonia nigronervosa* was gamma irradiated at various concentrations and released in healthy plants. Bunchy top affected suckers were irradiated with gamma rays (1 kr to 5 kr) and planted in the glass house. However, no banana plant showing mild symptom of bunchy top disease could be identified or produced.

During 84-85 the survey work was continued to various parts of Kerala, but no positive results were obtained.

Bunchy top virus affected plant parts were irradiated with gamma rays at 130 kr, 170 kr, 210 kr and 250 kr. Then, *Pentalonia nigronervosa* was allowed to acquire the virus from the irradiated plant parts and the same aphid was transferred to healthy plants for inoculation feeding. Here also, all the plants produced severe symptoms of bunchy top.

Only after getting mild strains, the cross protection studies can be carried out.

Control of Bunchy top disease of banana using granular insecticide in rice fallows

The objective is to find out the time and interval of application of granular insecticides for the best control of the disease.

Multi locational trials were carried out at Maruthoor, Alathoor and Kuttianikadu to fix the interval of application of the insecticide by treating the plants with the insecticide once in 2 months, 3 months, 4 months and 5 months. Observations are being recorded.

During the year 1983-84 a field experiment was conducted in the farmer's field with phorate and disulfoton treatments. The results indicated that combined with roguing, there was a 61.4% reduction of bunchy top in the treated plants compared to control.

Concluded Projects

Crop Improvement

Selection of superior types of Capsicum annuum with economic attributes from the segregating generation of intervarietal crosses

The objective is to combine the economic attributes scattered in different varieties and subsequent selection of superior type of chillies suited to our locality.

An intervarietal hybridisation programme, followed by selection of elite plants and field testing have brought out three promising chilli cultures. In all these trials the yield at the lower spacing was much higher than that at higher spacing, due to higher plant population. Culture No. 57 has consistently outyielded the standard varieties in all the three trials. This is a prolific bearer with medium long fruits with greenish tinge, thick rind and less wrinkles than Vellanadan. This is ideal for homestead cultivation. Culture No. 33 although a low yielder than the standard variety, possessed ideal plant type with erect and attractive fruits in bunches. All these cultures have low pungency and are suitable as green vegetables.

Ongoing Projects

Identification of suitable vegetable types of cowpea for homestead gardens

An experiment was laid out with 20 selections during Kharif 1984. Statistical analysis of the pod yield data indicated that Selection No. 16 and Selection No. 8 were on par. With regard to length of pod, Selection No. 10 (38.80 cm) was on par with Sel. No. 16 which had maximum pod length of 43.86 cm.

During Kharif 83-84, twelve varieties of vegetable cowpea were tried. The varieties Phillippines (white), PL-118, PTB-1, CG-11 and and V-38 were on par with the highest yielder CG-28.

Based on yield and yield attributes, about 10 to 12 varieties will be selected from the 20 varieties tried and the experiment will be repeated during Kharif 1985.

Genetic improvement of vegetable crops cultivated in the southern districts of Kerala—Uplands

The project aims at the varietal improvement of popular vegetables such as Bhindi, Brinjal, Chillis and Cucurbits, so that their yield potential, adaptability and tolerance to pests and diseases are enhanced.

Bhindi

Twelve selections were tried during Kharif and Rabi 1984. Bhindi variety AE-1 displayed consistency in yield in both the trials.

Bitter gourd

Nine selections were tried during Kharif and Rabi 1984. The lines were selfed to maintain homozygosity.

Brinjal

Twenty two selections were tried. The yield data indicates highest yield by SM-15 followed by SM-17 and SM-18. The experiments are to be continued.

During the year 1983–84, germplasm from various agroclimatic regions were collected and evaluated for yield potential and adaptability.

Identification of suitable varieties of companion crops for cassava—Experiment with cowpea

An experiment with 9 varieties of cowpea as companion crop was laid out during Kharif 1984. The data showing the yield of cowpea and tapioca tubers were examined.

The highest grain yield in cowpea was obtained from V-26 followed by New Era and HG-22 The uncertain and erratic weather conditions adversely affected the tuber yield. The highest tuber yield was recorded from the plot where Pusa Phalguni was grown as intercrop closely followed by V-59

Experiment with groundnut

An experiment with 10 varieties of groundnut as companion crop to tapioca was conducted during the Kharif 1984. The data on the pod yield and tuber yield were examined.

The highest pod yield was obtained from TMV-2 followed by Big Japan The tuber yield was maximum where TMV-9 was grown as companion crop followed by the plot where TMV-2 was grown. The erratic and uncertain weather conditions adversely affected the tuber yield.

Identification of sweet potato types suitable for the southern region

In uplands during 1983-84, 36 varieties were tried during Kharif The varieties Muttavella, Nedimal Chuvala and H 268 were on par with the highest yielder Chedivella

Summer rice fallows

The experiment was laid out in 17 x 2 RBD in the summer rice fallows on 14–2-'85. The vines of 4 varieties showed poor establishment. The experiment is in progress

The experiment will be repeated during Kharif 1985 and Summer 1986 Promising ones will be [repeated in MLT and released

From among the 36 varieties tried during Kharif 1983, the varieties Muttavella, Chedivella, Ethanvella, Paneneer vella and H-4021 were on par with the highest yielder Nedimal Chuvala.

Studies on mushrooms of Kerala

The objectives include collection, identification and cataloguing of mushroom flora of Kerala and screening and selection of promising local varieties for detailed study and standardisation of techniques for large scale cultivation.

The following species of mushrooms were collected, identified and preserved.

Hygrophorus conicus, Plemotus, Habellaria, Russula, Termitomyces microcarpus, Termitomyces robustus, Calvatia gigantia

The culture of paddy straw mushroom *Volvariella volvacea*, was maintained. An improved technique in the granular spawn production of *Volvariella volvacea* by autoclaving the grains directly for 2-3 hrs was standardised.

During the previous year, about 20 species of mushrooms were collected, identified and preserved. Experiments to cultivate *Volvariella volvacea* using banana leaf sheath and straw at a proportion of 3:1 were successful and yielded 250-300 g fresh mushroom.

Crop Management

Fertiliser management of minor tuber crops in coconut based cropping system

The objectives are to assess the performance of different tuber crops in coconut garden, to find out the optimum dose of fertiliser nutrient for tuber crops under partially shaded conditions, to study the incidence of pests and diseases of tuber crops raised in coconut garden, to investigate the physico-chemical changes of soil as influenced by cropping system, to estimate the uptake of of major nutrients by different tuber crops and to work out the economics of cultivation of different tuber crops.

A field experiment was laid out with four tuber crop varieties and three fertiliser management levels. The first year crop was harvested and yield data recorded.

Evolving intercropping system in Cassava for April-May planting

The objective is to evolve an economically suitable intercropping system in cassava for April-May planting.

A field experiment was laid out with five intercrops during April-May, 1985 at 2 locations, viz., Karunagappally and Neyyattinkara representing sandy loam and laterite soil type respectively.

The main crop cassava was harvested during June–July 1984.

With regard to the trial conducted at Karunagappally, the various treatments had significant influence over tapioca. The highest yield

was recorded by treatment where tapioca was intercropped with green gram. This was on par with tapioca intercropped with cowpea, groundnut and cluster beans. The treatment where tapioca was grown alone without weeding recorded the lowest yield.

The treatment effects were not significant as per the results of statistical analysis. Even so, the highest yield was recorded by the same treatment as in Karunagappally.

The experiment will be continued in 1985.

Nutritional requirements of Cassava

The objective is to determine the optimum dose of N & K for the variety M4 under different agroclimatic conditions and to find out the best time of split application of N & K for the variety.

The technical programme includes six treatments of different N & K doses to be applied at different growth stages of rice. The experiment was planted at two locations during June-July '83 viz., the sandy loam soils of Pallipuram and red soils of Kottukal, both in Trivandrum district. The crop was harvested in 1984.

At Kottukal, the highest tuber yield was given by the treatment where 50:50:100 kg ha NPK was applied with N and K given in three split doses, ½ as basal and ¼ each on 60th and 90th day after planting.

In the sandy soils of Pallipuram, the highest yield was obtained in the treatment where 50:50:50 kg ha NPK was applied in three split doses ½ at planting and ¼ each on the 60th and 90th day after planting. The same experiment is being repeated in the laterite soils of Nedumangad. The crop was planted on 15-10-84 and is performing well.

Standardisation of techniques for growing vegetables in pots

Though different types of pots and potting mixtures are used for growing vegetables, there is no fixed and recommended pot size and potting mixture for growing different vegetables in our State. Since the area available for cultivation of vegetables is less in the cities, it is possible to grow them in pots in the terrace of the building. With this object, the experiment was laid out as follows.

The data on the number of fruits recorded in the crops of Brinjal, Tomato and Bhindi and the weight of fruits in grams in each of these crops were recorded.

Maximum yield has been received from the combination of pot size 45 x 30 cms and mixture 2:1:1, followed by the combination of pot size 30 x 30 cms and mixture 1:2:1. The experiment is being repeated during the Rabi season also.

Production potential of cassava intercropped in coconut gardens

The objectives are to study the production potential of cassava intercropped in coconut garden as influenced by different levels of manuring, to find out the optimum plant population for cassava intercropped in coconut garden and to evaluate the influence of some growth regulators in cassava under intercropping in coconut garden

The first season's crop was harvested in April-May 1984 and chemical and statistical analysis are in progress. The field experiment for the second season was planted in June 1984. Recording of observation and chemical analysis of soil and plant samples are progressing as per the schedule

Investigations on the mycorrhizal association of cassava in enhancing the nutrient availability

The objective is to isolate mycorrhizal fungus from cassava roots capable of solubilising phosphorus. The isolated fungi will be screened for their efficiency in P-solubilisation and absorption. The promising associations will be tested under field conditions also. Standardisation of inoculation techniques will also be tried.

Survey was conducted for the collection of cassava roots of different varieties from different locations of Trivandrum district. The samples were stained and observed for the presence of mycorrhiza. The roots of cassava varieties like, Kariyilapothiyan, Rubber vella, Ponni vella, M4, Adukkumuttan, Mankuzhanthan, Kondachukappan and Malayarian were observed. All showed the presence of mycorrhiza.

For mass multiplication of mycorrhizal fungi (viz. *Glomus mosseae*, *G. etunicatum* and *G. fasiculatus*) have been transferred to sudan grass and cassava plants. This process is being continued to get sufficient inoculation for further studies. The mycorrhizal spores from each mesh were collected separately and observed under stereomicroscope and the spores are being maintained in sterile distilled water.

The experiment is in progress.

Plant Protection

Efficacy of different granular nematicides for the control of root-knot nematode of bhindi

Based on the pot culture trials, a field experiment involving the following treatments was laid out.

FMC, Ganox, Cytrolane, Nemacur, Phorate, Aldicarb, Furadan @ 50 mg ai/plant.

The experiment is in progress.

The previous years' work indicated that Temik, Furadan and Thimet were on par and effective in controlling the root knot nematode and thereby increasing the yield.

PULSES AND OIL SEEDS

Dryland agriculture with (a) cowpea varieties and (b) black gram varieties

The objective is to evolve cowpea varieties and blackgram varieties suitable to the southern region.

Cowpea: Four varieties viz. V-59, V-240, V-26 and local were tried at Chathannur and Neyyatinkara. Each variety was tried in plots of ten cents. The cultivation was done as per package of practices for cowpea.

At both the locations, the variety V-59 gave the highest yield and the local variety gave the lowest.

Blackgram: Five varieties viz. KM.-1, CO-3, TMV-1, T-9 and local were tried each in plots of ten cents at two locations (1) at Kariyavattom and (2) at Andoorkonam. Cultivation was done as per package of practices for blackgram. The crops are nearing harvest.

Screening of cowpea varieties for resistance against collar rot and web blight diseases

The organism causing sheath blight of rice *Rhizoctonia solani* is found to affect cowpea also causing collar rot and web blight disease where cowpea is cultivated as a fallow crop in the rice field. Unless varieties known to have resistance against the disease are identified and popularised, the whole programme of cultivating cowpea in rice fallows will be a failure. Hence, the present project is proposed to identify collar rot-resistant varieties suitable for fallow cropping in rice fields.

Rhizoctonia solani infecting cowpea and rice in Kerala was isolated and purified.

A pot culture experiment with 25 varieties of cowpea obtained from Regional Agricultural Research Station, Pattambi was carried out. The organism, *Rhizoctonia solani* infecting rice causing sheath blight disease was multiplied on sand-maize medium. The organism was inoculated in pots artificially both in the soil and also by spraying. The organism causing sheath blight in rice did not infect cowpea to cause collar rot.

Since the rice isolate from Vellayani failed to infect cowpea, it is proposed to conduct a pot experiment with rice isolate from different rice growing areas of Kerala, viz. Karamana, Kayamkulam, Pattambi and Nileswar. Sheath blight infected rice samples were collected from the above localities and isolations were made.

FODDER CROPS

Varietal evaluation for guinea grass under open and partially shaded conditions in coconut plantations

The objectives are to identify suitable guinea grass clones with high yield potential coupled with desirable economic attributes under open condition and as an intercrop in coconut plantations.

Observations were taken on grass yield and important yield attributes. Twelve cuttings were taken.

The variety FR. 600 gave the highest green fodder yield (7.18 kg) followed by Mackuenii (5.44 kg) and FR. 552 (5.20 kg).

During 1983-84, the first five cuttings were taken from the experiment and observations were taken on grass yield and yield attributes.

The experiment under partially shaded conditions will be laid out during Kharif 1985

FARM ECONOMICS, EXTENSION AND STATISTICS

Extent of adoption and constraints in the adoption of improved agricultural technologies

The objectives are to study the extent of adoption of improved agricultural practices as recommended in the KAU package of practices at the micro level with particular reference to the major crops grown in the area, to identify the constraints in the adoption and transfer of the recommended technology and to suggest ways and means to overcome these constraints.

The survey of households was completed in Trivandrum district. Data collection, pooling of data and statistical analysis were completed. The data collected from this region as well as from the other regions of the NARP were analysed using the computer facilities at the University of Kerala and V.S.S.C., Trivandrum. The final report of the project will be ready shortly.

Utilisation pattern of farm information sources by the homestead farmers in NARP (SR)

The objectives are to study the utilisation pattern of farm information sources by the homestead farmers in the region.

Questionnaire needed for the data collection was completed and the sampling methods were decided. Literature collection was almost over.

Front line demonstration with the Gingelly variety Thilothama, during the third crop season in rice fields

The objectives are to popularise the variety among the farmers, to develop selected local farmers as source of seed material for other farmers, and to identify the location specific problems faced by the farmers with the variety.

Twenty demonstration plots in Muttacaud and fifteen in Kalliyoor villages each in ten cents were laid out during the 3rd crop season in summer fallows. These two villages have already been adopted by the KAU. Seeds and fertilisers were supplied to the farmers free of cost. One day training on the method of cultivation was given in both these villages. The crop stand is satisfactory and the trial is in progress.

Basic socio-economic survey of the households in the southern region of the NARP (Vellayani)

A basic socio economic survey was initiated during the year under report. The objective of the survey is to study the socio-economic characteristics influencing the adoption behaviour of the farmers and to develop need-oriented research projects under the homestead conditions existing at present. The survey is proposed in 330 households under the selected panchayats of the districts of Trivandrum, Quilon, Pathanamthitta, Alleppey and Kottayam which are under the southern region, where crops are raised by farmers under different farming situations. The nine such farming situations identified in the region included the wet lands and the dry lands under the coastal sandy, urban suburban, midland, mid upland and backwater areas.

Fifty six households under 13 panchayats were surveyed in Trivandrum district during the year under report. The survey work is in progress.

PLANT PROTECTION

Investigations on the biology and population dynamics of earthworms and their role in agricultural productivity

The objective is to study the population of earthworms in different soil tracts in Kerala and the role of earthworms in improving crop production and productivity of the soil.

Two hundred and twenty two soil samples were collected from different locations of Trivandrum district covering different types of soil and crops. Hand sorted the samples and the number of earthworms in each sample was recorded. The worms were reared in the laboratory but it was observed that the species collected from the fields did not breed in the laboratory.

Samples of earth worms were taken to U.A.S., Bangalore for identification. The principal species collected from the garden lands was identified as *Lampito mauritii*.

Chemical control of major pests of pulses in rice fallows

The objective is to evolve a pest control recommendation for pulse crops in rice fallows. Two trials under this have been laid out and the observations are being recorded. The trials are in progress.

Studies on the population build up of nematodes (Meloidogyne incognita, Radopholus similis and Helicotylenchus sp.) *in homestead gardens of Trivandrum district*

The objectives were to study the nematodes associated with important crops in homestead gardens, to determine the infective level of nematodes in different crops, to determine the seasonal fluctuations of nematodes associated and to study the influence of one host plant on the build up of nematode population on another.

In sandy soil the homestead having coconut and banana recorded higher populations of *Helicotylenchus* sp. (603/5 g) and *R. similis* (46/5g) than those with banana alone. The homesteads having red and laterite soil types did not exhibit such variation.

In the homesteads having laterite soil with crops like coconut, banana, tapioca and pepper, the *Helicotylenchus* sp. population and *M. incognita* population in tapioca and pepper were high.

In sandy soil, the population of *Helicotylenchus* sp. (138/100 g) and *R. similis* (81/100 g) population were high in banana rhizosphere, when banana was grown along with coconut and pepper. In banana with coconut and tapioca the nematode population was slightly lower.

Crop loss estimation and economic threshold levels of root-knot nematode infesting vegetables

The aim of the experiment is to study the extent of crop loss due to the root-knot nematode at various population levels and economic injury levels of the nematode at various stages of the crop.

Field trials using bhindi, brinjal and bittergourd were laid out in October, 1984 after finding out the initial field population of nematodes.

The results indicated that higher levels of nematode inoculation significantly reduced the yield. In 10,000 *M. incognita* inoculated plants, the yield reduction was 41 per cent in bhindi and 43 per cent in brinjal and in 1,000 *M. incognita* inoculated plants, the reduction was 32 per cent in bhindi and 34 per cent in brinjal. In the field trial, maximum reduction in yield was obtained in T_4 (ten fold increase over T_1), followed by T_3 (5 fold increase over T_1). The percentage reduction was 28 in bhindi, 47 in brinjal and 14 in bittergourd.

Studies on the pathogenicity of root-knot nematode M. incognita and reniform nematode Rotylenchulus sp. in betelvine and their role in the incidence of bacterial spot

The objective is to study the crop loss and economic injury level of *M. incognita* and *Rotylenchulus* sp. on betelvine and to find out whether these nematodes have any role in the incidence of bacterial spot.

Two pot culture experiments were carried out to study the pathogenicity of root-knot nematode in betelvine. In the first trial, the length of vine and leaf production were affected by the nematode; but there was no statistical difference. Maximum reduction (10 per cent) was observed in 10,000 larvae. The yield of leaves (vetta) was from 82 per cent to 54 per cent (0.34 per cent reduction in yield). In the second trial, the reduction in yield in the number of vetta leaves was 43 per cent in T_4 (10,000 larvae/plant) and 17 per cent in T_3 (1,000 larvae/plant). Leaf area, shoot weight, root weight etc. were reduced in T_4 and T_3. However, the effects were not statistically significant.

Control of pests of vegetables

The objective is to arrive at common control measures for the pests of vegetables grown in the homesteads.

Periodical observations were taken. The data were analysed. Conclusive results were not obtained in the case of insect control for bhindi and brinjal. In chillies the application of all the treatments one week after planting resulted in significantly lower population of white fly and aphids when compared to control. Maximum yield was obtained in phosalone 0.05%. The experiment is being continued in farmer's field.

Survey and control of 'Pollu' beetle of pepper

The objective is to assess the extent of damage caused by the pest and to select the most effective insecticide for the control of the pest in the field.

Survey on the pest incidence in the six Panchayats in Ranni (Pathanamthitta district) in July, 1984 revealed a level of infestation ranging from 13.18 to 50.73 per cent in the different locations.

A field trial was laid out in Uzhamalackal (Nedumangad) in an infested pepper garden. The insecticide monocrotophos, endosulfan dimethoate and quinalphos were applied at two doses in July 1984. The second round of insecticide spraying was given during the first week of October, '84. Spike and berry infestation and pepper yield were assessed. Results indicated that spike and berry infestation was least in endosulfan 0.05 per cent treated vines. The yield was also highest in this treatment.

Bionomics and control of Paradasynus rostratus on coconut

The objective is to study the biology, ecology, nature and extent of damage on coconut and evolve suitable methods to control the pest.

The seasonal intensity was observed by tagging infested older bunches in palms and noting the damage at bimonthly intervals. Younger bunches were tagged as and when older bunches were harvested periodically. Observations are being continued.

The experiment to fix the schedule of insecticide application for the control of coreid bug was started in Chirayinkil.

Earlier work indicated that BHC 0.2%, carbaryl 0.1% or endosulfan 0.1% could effectively control the pest. Correlation studies between the area damaged in nuts and nut characters indicated that negative correlations exist between the area damaged and weight of copra, oil content and dry weight of husk.

Determination of waiting periods of insecticides recommended for the control of pests of vegetables of Kerala

The objective is to fix the waiting periods of different insecticides recommended for the control of pests of different vegetables grown under different agroclimatic conditions of Kerala

The residue analysis of fenitrothion, quinalphos and malathion sprayed on bittergourd were determined in both rainy and summer seasons (washed and unwashed fruits) and the waiting periods were worked out

Waiting periods for fenitrothion, quinalphos and malathion were 3 to 4 days both for the rainy and dry season in the washed and unwashed fruits. For carbaryl it was 8 days for washed and 9 to 11 days for unwashed fruits in the seasons.

Earlier waiting periods of fenitrothion, malathion and quinalphos on bhindi were estimated in rainy and dry seasons and also malathion and quinalphos on brinjal

Control of cowpea aphids in homestead gardens

The project aims at evolving an effective and economic method of control of cowpea aphids on a cost benefit basis

An experiment was laid out in the farmers' field at Nemom. Cowpea seeds were dibbled and granules of phorate and carbofuran were applied at seeding as per technical programme. Observations on the incidence of aphids are being recorded. Malathion, quinalphos and fish oil insecticide were also applied on need basis

The incidence of beetle was low in the treatments of carbofuran (1 kg ai ha) + malathion (0.05%). Eventhough carbofuran was most effective, quinalphos 0.025% was found to be cheapest and effective one.

Improvement of bee keeping practices in the homesteads

The objectives are to evolve means in removing constraints in the management of bees and to make bee keeping a profitable venture in the homesteads. Twenty bee colonies from Anchal selected on the basis of desirable characters of colony were brought to the Agricultural College. A small apiary unit has been established at the College campus to undertake studies envisaged.

All the colonies were allowed to establish at the new site. Because of the heavy rain prevailed, and also due to want of sufficient time left for building new combs and collection of honey, the yield was negligible. An apiarist deputed from the Khadi and Village Industries Commission has assisted in connection with the establishment of the apiary unit.

During regular and periodic inspections, Wax moth, *Oalleria mellonella* infestation could be observed in April, May and June months. Constant and timely cleaning and management practices could effectively control infestation During the unfavourable climatic conditions, the strength of a few colonies dwindled Continuous artificial feeding with boiled sugar syrup has been done as management practice.

Infestation by parasitic mites was observed in four colonies during July August The infestation could be checked effectively by proper management practices, including cleaning procedures with potassium permanganate solution and silver nitrate solution It was observed that potassium permanganate solution could effectively control mite infestation when used for cleaning. The frames, brood chambers, floor board etc. were wiped skilfully and allowed to dry.

Wax moth infestation mite infestation and uncongenial climatic conditions together had badly affected the strength of the bee colonies resulting in desertion of four colonies.

Further spread of the bee enemy infestation could be effectively checked by proper cleaning and other management practices. The frames are arranged in the brood in such a way that the microclimate is more suited under the prevailing conditions. When required the supers were also removed to create the microclimatic requirements to stimulate egg laying.

Artificial feeding using sugar syrup had been continuing to maintain the colonies during lean periods.

Preparation of a pollen substitute was tried.

It was observed that the preparation of pollen substitutes were not acceptable to the bees. Preparations using other ingredients are being, attempted.

Scientific queen rearing is considered to be the most difficult aspect in apiculture.

Use of organic wastes green leaves for the control of nematodes associated with banana

Green leaves of eupatorium clerodendron, Panal and Glyricidia were tried in one field trial In another field trial organic wastes such as saw dust, coir dust, paddy husk and cashew shell powder were tried along with untreated control Population build up of the nematodes and symptom of attack on the roots were recorded Three species of nematodes viz, *Radopholus similis*, *Helicotylenchus* and *Pratylenchus* were found to be the main nemotode parasites attacking banana Mean lesion index in various treatments in the two experiments were recorded

In experiment 1, Panal leaves gave the least lesion index (2.3) followed by clerodendron (3.0) In experiment 2 none of the treatments were effective in reducing the nematode attack. The plants are maintained to take the final observations

Mass culture technique for the production of blue green algal cultures

The objectives include the isolation of local strains of N fixing blue green algae, standardisation of conditions of optimum for N fixation and mass production of BGA cultures

The pH tolerance of *Anabaena oryzae* were conducted in 1983-84 using Fogg's medium with varying pH levels

Growth of algae under artificial illumination was estimated in terms of air dried algal mat weight after 60 days of growth (1) Maximum growth was obtained at pH 7 5 followed by pH 5 5 (2) The culture of *Anabaena oryzae* was found to fix nitrogen to the extent of 5 47 mg/g fresh weight at pH 7 5 in Foggs' medium after 60 days of growth. (3) Fresh isolations of *Nostoc* sp, and *Anabaena ambigua* were made from RRS, Moncompu and Pazhanchira ela which could fix nitrogen

Studies on rhizobium—Isolation of efficient strains of rhizobium

The objectives of the experiment are isolation of efficient strains of rhizobium for different fodder and grain legumes cultivated in the State, mass production of such cultures and standardisation of conditions optimum for nitrogen fixation in acidic soils

Results indicate that *Rhizobium* isolate KAU No 12 of blackgram (locally isolated) was superior to all other isolates including the standard check in terms of increase in plant fresh weight and dry weight.

Field as well as pot trials involving rhizobia for greengram will be conducted during 1985-86 as part of a PG programme

Visitors

Sri. Santhanan, Director of Works, ICAR visited on 28-4-84 for inspection of the Civil Works in progress and discussion on the items of work proposed.

Dr. Appa Rao, World Bank, visited on 14-6-84 for monitoring of the KAEP and NARP.

Dr Gyan Singh, Director, Millets, Madras visited on 16-6-84 for discussions with the Associate Director and the PAO, Trivandrum.

NARP Monitoring team consisting of Dr. T. C. Jain, ADG, ICAR and Sri A. Balasubramonian, Senior Scientist, NARP, ICAR visited on 17-9-84 for monitoring and discussions with scientists of the project and later with Heads of Departments in the College.

Dr. Vishnu Swarup, Former Project Co-ordinator (Vegetables), ICAR visited on 20-9-84 for discussions with the Associate Director on vegetable research.

Dr J. S. Gill, Project Co-ordinator, Dr. Abrar M. Khan, Professor Emeritus, Aligarh Muslim University, and Dr J. C. Edward, Tech. Consultant, Rallis India Ltd., Bangalore visited on 11-12-84 as members of the Quinquennial Review Team on Co-ordinated Project on Nematodes.

Dr B. Choudhury, Head, Division of Vegetable Crops and Floriculture, IARI, New Delhi visited on 7-1-85 for discussion on Vegetable Research. He visited vegetable growing areas and delivered extension lecture on 'Advances in Vegetable Research'

Sri. G. Ramachandran, Former Vice-Chancellor, Gandhigram Rural Institute visited on 18-1-85 to give extension lecture on 'Modernisation of Agriculture.

Dr. Mahajaini, Consultant on T & V visited on 15-3-85 to discuss with Associate Director on T & V and related matters.

Sri A. Balasubramonian, Senior Scientist, NARP, ICAR visited on 28th and 29th March, 1985 for monitoring. He inspected the remodelling work of the laboratories in progress and addressed the NARP scientists reviewing their research work.

1.25 COCONUT RESEARCH STATION, BALARAMAPURAM

The Station was established in the year 1963 located at Kattachalkuzhy, 4 km south of Balaramapuram on the Balaramapuram-Vizhinjam route.

The area of the farm is 14.13 ha. with an elevation of 90 m above M S L. The soil type is deep red loam with a pH of 5.3. Average rainfall of the station is 1500 mm year.

The major objective of the Station is to conduct research in coconut in typical red loam soils (Vellayani series) of South Kerala with particular emphasis on agronomic aspects and plant protection.

Sri. K. Sivasankara Pillai continued to be in charge of the Station during the year.

RESEARCH

Total No. of research projects as on 31-3-85 is 5.

Ongoing Projects

NPK fertilizer trial starting from young seedlings

The objective is to study the response of palms from seedling stage to application of NPK at different levels.

A significant increase in yield was obtained with the application of nitrogen. When N was increased from 0 to 340 g and 680 g per palm per year the yield increased by 70% and 97% respectively. But the increase in yield between higher doses of N was 16% which was not significant.

Application of P_2O_5 at 225 g and 450 g per palm per year increased the yield by 20% and 51% respectively over control. The yield differences were not significant. However, the increase was significant at 450 g dose as compared to the control.

Significant increase in yield was observed with K application. The yield increased from 2.1 nuts/palm/ year to 23.9 and 33.6 when K_2O was increased from 0 to 450 g and 900 g per palm per year.

No significant difference in yield was noted for N_0 in combination with P. However, N_1 in combination with higher doses of P increased the yield eventhough the difference in yield was not significant at the yield eventhough the difference in yield was not significant at N_1P_1 (27 nuts) and N_1P_2 combinations (26 nuts). The higher dose of N in combination with P_0 and P_1 gave 21 nuts while in combination with P_2 it gave 34 nuts which was found to be the maximum among NP combinations.

Higher doses of K in combination with N increased the yield though the yield differences were not significant for N_0 and N_1 in combination with K_1 and K_2. N_2K_2 combination significantly increased the yield by 44 nuts per palm. N in the absence of K gave only nuts in the range 1 to 3 per palm per year.

No significant difference in yield was observed for P_0 and P_1 in combination with K_1 and K_2 though higher doses of K increased the yield in combination with P. But a significant increase (44 nuts per palm per year) in yield was obtained at P_2K_2 combination which was superior to P_1K_1 (32 nuts) and P_2K_1 (26 nuts). P in the absence of K gave nuts only in the range of 1-3 nuts per palm per year.

Spacing-cum-Manurial trial

The object of spacing-cum-manurial experiment on coconut starting from seedling stage is to study the effect of different levels of spacing and fertiliser on the growth and productivity of coconut.

No significant difference in yield was observed from palms planted with a spacing of 5 x 5 m and 7.5 x 7.5 m and the yield was higher compared to that obtained from 10 x 10 m spacing. These treatments gave 289, 312 and 151 nuts per palm. Manuring helped to increase the yield. In control plots (M_0) the yield was only 29 nuts while in plots treated with 340 g N: 225 g P_2O_5: 450g K_2O/tree/year gave 333 nuts and those with 680 g N: 450 g P_2O_5: 900 g K_2O/tree year gave 390 nuts. The difference in the number of nuts was not significant at higher levels of manuring. A significant interaction was observed between spacing and manuring.

Without fertiliser application 7.5 x 7.5 m spacing gave more yield (79 nuts), compared to 5 x 5 m and 10 x 10m (4 nuts each) which was significant.

Progeny row trial

Progeny row trial with T x D and T x GB seedlings was taken up to make comparisons in performance and yield.

The analysis of the data was done using missing plot technique. The progenies did not differ significantly in the family T x GB whereas they differed with family T x D. The genetic variance is estimated as 474.42. Selection can be made in this family on genetic basis. The pooled analysis of the data for 1984 showed that there was no significant difference in the yield between the two families and progeny means of families.

Intercropping with pepper in coconut gardens

Varietal-cum-fertiliser studies on pepper grown as an intercrop in coconut garden using coconut palm as standard was to screen out the most suitable variety for intercropping in coconut garden and to work out the suitable fertiliser schedule for pepper grown as intercrop in coconut garden.

The experiment is commenced in 1980 only and results are awaited.

Screening of high yielding coconut varieties against pests and diseases:

Screening of high yielding coconut varieties which are tolerant or resistant to different pests and diseases was the objective of the experiment.

No serious attack of pests or diseases was noticed.

Production and sale of T x YD seedlings

Selected West Coast Tall mother palms at this station were crossed with Yellow Dwarf (Pollen obtained from promising yellow dwarf palms of farmers outside the station) and 2937 Nos of T x YD coconut ssedlings were sold.

Production and sale of West Coast Tall seedlings

Altogether 3544 West Coast Tall seedlings were sold from this station during year.

Lab to Land Programme

Lab to Land Phase II programme was successfully implemented in this station.

2. FACULTY OF VETERINARY AND ANIMAL SCIENCES

2.1 COLLEGE OF VETERINARY AND ANIMAL SCIENCES

The College was established in 1955 at Mannuthy about 6 km east of Trichur on NH 47. The College became a constituent unit of the Kerala Agricultural University in February, 1972. The College and residential campus cover an area of 195 hectares.

Departments

Dr. M. Krishnan Nair continued as the Dean of the Faculty of Veterinary & Animal Sciences. Dr. K. Radhakrishnan continued as the

Professor (Research Co-ordination) and Dr. T. R. Sankunny as Assistant Registrar (Technical). The following 19 departments viz. Anatomy, Animal Management, Animal Reproduction, Animal Breeding & Genetics, Clinical Medicine, Dairy Science, Extension, Microbiology, Nutrition, Parasitology, Pathology, Pharmacology & Toxicology, Physiology & Biochemistry, Poultry Science, Preventive Medicine, Surgery, Veterinary Public Health, Statistics and Animal Production Economics continued to function during the year.

Two Veterinary Hospitals one at Mannuthy and the other at Kokkalai, Trichur, along with the Livestock Farm, Poultry Farm, Pig Breeding Farm and the A. I. Centre served as institutional units of the College.

Changes in personnel

Dr. C. P. Neelakandha Iyer assumed charge as Professor and Head of the Department of Animal Reproduction on 1-6-84 and continued. Dr. E. Mathai was Professor in the Department of Animal Reproduction from 9-4-84 to 31-5-84 and was posted as Special Officer (Academic Improvement) from 24-8-84. Dr. M. S. Nair was Professor in the Department of Animal Reproduction from 7-6-84 onwards. Dr. E. Madhavan was posted as Professor in the same department from 7-6-1984. Dr. K. N. Aravindaghosh and Dr. K. V. Athman assumed charge as Assistant Professors of Animal Reproduction on 7-6-1984. Dr. U. M. Aleyas was Professor in the Department of Clinical Medicine from 28-11-1984 onwards. Dr. P. Pavithran assumed charge as Professor on 7-6-1984 and posted as Head of the Department of Dairy Science on 12-11-1984. Dr. M. J. Sebastian was appointed as Professor in the Department of Dairy Science on 7-6-1984. Dr. U. T. Francis was the Assistant Professor in the Department of Dairy Science from 1-8-84 to 29-8-84 and posted as Associate Professor in Krishi Vignan Kendra, Pattambi. Dr. M. Mukundan worked as Assistant Professor till 10-4-1984 when he was posted to the Cattle Breeding Farm, Thumburmuzhi.

Dr. S. Sulochana worked as Associate Professor in the Department of Microbiology upto 25-5-84 when she was posted as Professor and Head of the Department from 26-5-1984 onwards. Dr. V. Jayaprakasan joined as Assistant Professor in the Department of Microbiology on 13-4-1984 after completion of course and research work for Ph. D. programme. Dr. G. Krishnan Nair, Assistant Professor was relieved from the Department on 18-12-1984.

Dr. Zacharias Cherian was posted as Professor in the Department of Pharmacology and Toxicology on 19-10-1984. Dr. A. M. Chandrasekharan Nair joined as Assistant Professor on 28-4-1984 and Dr. C. M. Aravindakshan was appointed as Jr. Assistant Professor on 18-10-1984 in the Department. Sri. K. A. John assumed the post of Research Associate on 21-1-1985 in the same Department. Dr. R. Sabarinathan Nair.

Professor (Research Co-ordination) and Dr. T. R. Sankunny as Assistant Registrar (Technical). The following 19 departments viz. Anatomy, Animal Management, Animal Reproduction, Animal Breeding & Genetics, Clinical Medicine, Dairy Science, Extension, Microbiology, Nutrition, Parasitology, Pathology, Pharmacology & Toxicology, Physiology & Bio-Chemistry, Poultry Science, Preventive Medicine, Surgery, Veterinary Public Health, Statistics and Animal Production Economics continued to function during the year.

Two Veterinary Hospitals one at Mannuthy and the other at Kokkalai, Trichur, along with the Livestock Farm, Poultry Farm, Pig Breeding Farm and the A. I. Centre served as institutional units of the College.

Changes in personnel

Dr. C.P. Neelakanda Iyer assumed charge as Professor and Head of the Department of Animal Reproduction on 1-6-84 and continued. Dr. E. Mathai was Professor in the Department of Animal Reproduction from 9-4-84 to 31-5-84 and was posted as Special Officer (Academic Improvement) from 24-8-84. Dr. M.S. Nair was Professor in the Department of Animal Reproduction from 7-6-84 onwards. Dr. E. Madhavan was posted as Professor in the same department from 7-6-1984. Dr. K. N. Aravindaghosh and Dr. K. V. Athman assumed charge as Assistant Professors of Animal Reproduction on 7-6-1984. Dr. N. M. Aleyas was Professor in the Department of Clinical Medicine from 28-11-1984 onwards. Dr. K. Pavithran assumed charge as Professor on 7-6-1984 and posted as Head of the Department of Dairy Science on 12-11-1984. Dr. M. V. Subramaran was appointed as Professor in the Department of Dairy Science on 7-6-1984. Dr. U. T. Francis was the Assistant Professor in the Department of Dairy Science from 1-8-84 to 29-8-84 and posted as Associate Professor in Krishi Vignan Kendra, Pattambi. Dr. M. Mukundan worked as Assistant Professor till 10-4-1984 when he was posted to the Cattle Breeding Farm, Thumburmuzhi.

Dr. S. Sulochana worked as Associate Professor in the Department of Microbiology upto 25-5-84 when she was posted as Professor and Head of the Department from 26-5-1984 onwards. Dr. V. Jayaprakasan joined as Assistant Professor in the Department of Microbiology on 13-4-1984 after completion of course and research work for Ph. D. programme. Dr. G. Krishnan Nair, Assistant Professor was relieved from the Department on 18-12-1984.

Dr. Zacharias Cherian was posted as Professor in the Department of Pharmacology and Toxicology on 19-10-1984. Dr. A. M. Chandrasekharan Nair joined as Assistant Professor on 28-4-1984 and Dr. C. M. Aravindakshan was appointed as Jr. Assistant Professor on 18-10-1984 in the Department. Sri. K. A. John assumed the post of Research Associate on 21-1-1985 in the same Department. Dr. R. Sabarinathan Nair,

Associate Professor was promoted as Professor in the Department of Dairy Science on 19-10-1984. Dr. B. Ambika Varma joined as Research Associate in the Department of Animal Reproduction on 27-9-1984.

Faculty improvement programme

The following members of the Faculty were on deputation or on leave for higher studies.

Dr. K. R. Harshan, Assistant Professor, Department of Anatomy for the entire period under report.

Dr. C. P. Neelakanta Iyer, Professor, Department of Animal Reproducton upto 31-5-1984.

Dr. K. V. Raghunandanan, Assistant Professor, Department of Animal Breeding and Genetics.

Dr. U. T. Francis, Assistant Professor, Department of Dairy Science till 31-7-84.

Dr. P. C. James, Assistant Professor, Department of Microbiology.

Dr. V. Jayaprakasan, Assistant Professor, Department of Microbiology from 1-4-84 to 13-4-84.

Dr. R. Madhusoodanan Pillai, Assistant Professor, Department of Microbiology.

Dr. G. Krishnan Nair, Assistant Professor, Department of Microbiology from 19-12-1984 onwards.

Dr. K. V. Valsala, Associate Professor, Department of Pathology from 27-2-84 to 30-11-84.

Dr. K. Narayanankutty, Assistant Professor, Department of Poultry Science from 19-12-84 onwards.

Dr. K. Venugopalan, Assistant Professor, Department of Preventive Medicine from 8-5-1984 onwards.

Dr. E. Nanu, Associate Professor, Department of Veterinary Public Health.

Seminars/Symposia/Workshops attended by the Scientists

Dr. M. S. Nair, attended Farmers' Seminar at Mannarghat in connection with inauguration of Veterinary Polyclinic, Mannarghat on 22-6-1984.

Dr. K. Prabhakaran Nair, attended a Seminar on Common infertility Problems of cattle organised by ICDP, Mavelikkara on 8-7-84.

Dr. M. S. Nair, attended a Farmers' Seminar at Calicut on 15-7-84 in connection with inauguration of Infertility Centre at Calicut. He also attended a Seminar organised by KVK, Pattambi on 10-8-1984 at Ambalapara.

Dr. K. V. Athman, attended NSS Camp at Poovanchira, Pattikkad on 10-8-84.

Dr. M. S. Nair attended a Farmers Seminar on 15-9-84 organised by KVK, Pattambi at Varode.

Dr. K. N. Aravinda Ghosh and Dr. M. S. Nair attended sterility camp at Nilamboor organised by ICDP, Nilamboor on 19-9-84 and 20-9-84.

Dr. E. Madhavan attended sterility camp at Anthikad on 13-10-1984 organised by Veterinary Polyclinic, Anthikad.

Dr. M. S. Nair attended a Farmers Seminar organised by South Malabar Gramin Bank at Parur on 14-10-85 and a sterility camp at Nilamboor from 15-10-84 to 17-10-84 organised by ICDP, Nilamboor.

Dr. E. Mathai attended infertility Camp at Parakode organised by CDP, Sasthamkotta on 10-10-84, at Vadakadathur on 11-10-1984 and at Peringanadu on 12-10-84.

Dr. M. S. Nair and Dr. E. Madhavan attended sterility camp at Kalady on 27-10-84, and an Infertility Camp at Marakkal on 10-11-84.

Dr. M. S. Nair, attended Infertility Camp at Mannady on 8-11-84 organised by RAIC, Sasthamkotta.

Dr. V. Sudarsanan attended Infertility Camp at Kottarakkara organised by ICDP, Kottarakkara on 20-11-84 and an Infertility Camp at Alwaye organised by ICDP, Alwaye.

Dr. M. S. Nair, attended Farmers Seminar at Angadikadavu, Cannanore on 24-11-84 organised by South Malabar Gramin Bank and an Infertility Camp at Mallapally organised by Veterinary Polyclinic, Mallapally.

Dr. E. Madhavan and Dr. M. S. Nair attended Infertility Camp at Nilamboor on 7 to 8th January 1984.

Dr. V. Sudarsanan, attended Infertility Seminar at Calicut on 19 & 20, 1985.

Dr. M. S. Nair attended District Level Seminar at Malappuram under the auspices of SADU on 21-1-85 and a Seminar organised by KAU at Viyyoor on 15-2-85 on clean milk production and an Infertility Camp at Mattoor, Kalady on 18-2-1985.

Dr. V. Sudarsanan attended Infertility Camp at Kottayam organised by RAIC, Kottayam on 25-2-1985.

Dr. E. Madhavan, attended sterility camp at Nilamboor on 25-2-85 and 26-2-85 organised by RAIC Nilamboor.

Dr. E. Madhavan and Dr. M. S. Nair attended Infertility Camp at Tavanur on 10-3-1985.

Dr. M. S. Nair attended seminar at Triprayar in connection with inauguration on Veterinary Polyclinic, Triprayar.

Dr. M. S. Nair and Dr. E. Madhavan, attended Infertility Camp at Mattoor, Kalady on 31-3-1985 organised by KAU.

Dr. G. Mukundan, Professor and Head attended the Assessment Committee meeting of Agricultural Recruitment Board (ICAR) held at New Delhi from 1st, 2nd May 1984. He along with Dr. C. A. Rajagopala Raja and Dr. Sosamma Iype, Associate Professors attended the scientific seminar in connection with the Diamond Jubilee Celebrations of NDRI, Bangalore on 22nd September 1984. He also attended the meeting of the 7th Five Year Plan proposals for Animal Husbandry and Dairying at Trivandrum on 28-9-1984.

Dr. C. R. Girija, Junior Asst. Professor attended the workshop on "Writing articles for Newspapers" conducted from 6th-7th March 1985 at the Directorate of Extension, KAU, Mannuthy.

Dr. K. M. Alikutty, Professor & Head, attended All India Conference on current concepts of the various disorders of Ruminant stomach at Madras Veterinary College on 8th and 9th January 1985.

Dr. V. Raju, Assistant Professor (Extension) attended a training course on video production from 22-2-85 to 28-2-85 at Jaipur.

Dr. P. J. Rajkamal, Junior Asst. Professor (Extension) attended the training course on video production from 8-1-85 to 10-1-85 at Trivandrum.

Dr. K. T. Punnoose attended Annual Conference and symposia on mechanisms of immunity in infectious diseases of livestock and poultry held at Marathwada Agricultural University, Parbhani and presented a paper on "Classification of R Factors of *Escherichia coli* isolated from poultry based on fertility (fi) test.

Dr. V. Jayaprakasan attended Annual Conference and Symposia on Mechanism of Immunity in Infectious Diseases of Livestock and Poultry held at Marathwada Agricultural University, Parbhani and presented a paper on "Leukocyte migration Inhibition test" (LMIT) for the diagnosis of *Corynebacterium pseudotuberculosis* infection in goats.

Dr. E. Sivaraman, attended the National Symposium on Recent Advances in Mineral Nutritions and the 1st Annual Conference of Animal Nutritions Society of India from 29-31st October 1984.

Dr. Maggie D. Menachery attended the 12th AICRP Workshop held at NDRI, Karnal from 3-5 March 1985.

Dr. A. Rajan, Professor attended a Seminar on Clinical Diagnostic Methods at Madras on 28-8-84 and the ICAR task force meeting on Mycotoxicosis at Delhi on 11-9-84.

Dr. K. I. Maryamma attended a seminar on Nephrotoxic Mycotoxin at Mannuthy on 28-9-84.

A Seminar on KAU 2000 AD was attended by Dr. A. Rajan, Dr. G. Mukundan, Dr. T. Sreekumaran and Dr. N. Divakaran Nair on 22-11-84 to 24-11-84 at Vellanikkara.

Dr. A. Rajan and Dr. K. M. Ramachandran participated in the seminar organised by Lions Club on 30-1-85 at Palghat and gave talks on Rabies and sinus tumour.

Dr. T. Sreekumaran and Dr. N. Divakaran Nair participated in the Summer Institute on National Neonatal diseases of calves at Izatnagar from 4-4-84 to 26-4-84.

Dr. Jacob V. Cheeran attended the wild life conference at Periyar in January 1985.

Sri. V. R. Raghunandanan attended the seminar on pollution problems of Kerala at Ambalamedu on 5-4-84, Development of Eco system at Cochin on 5-5-84 and Air pollution control in Kerala at Cochin on 10-10-84.

Dr. G. Nirmalan presided over a session in the National Animal Physiology Research Workers Conference held at Karnal from December 3rd to 7th 1984 and presented a paper.

Dr. G. Nirmalan attended a seminar on use of radio isotopes in Animal Science Research held at Srinagar from 22nd to 25th of May 1985.

Dr. E. P. Paily, Professor, attended a National Seminar and Avian Diseases at Madras.

Dr. A. M. Azeez attended the 3rd Annual Convention of Indian Society of Veterinary Medicine.

Dr. P. O. George, Professor and Dr. K. N. Muraleedharan Nayar attended the 8th Annual Symposium and Seminar organised by the Indian Society for Veterinary Surgery at Akola from 17-12-84 to 20-12-84.

Seminars workshops conducted

A total of 37 one day seminars were organised by the Extension Department in the field of Animal husbandry.

A special lecture on genetic engineering was given by Dr. N. Krishnan Nair, Tata Institute of Fundamental Research, Bombay on 9-4-1984.

A lecture on "Immuno stimulation and immuno regulation by non-specific stimulants" was given by Dr. B. B. Mallick, Professor of Eminence, IVRI, Izatnagar on 3-5-1984.

INSTRUCTIONAL FARMS/HOSPITALS

2.1.1 University Livestock Farm, Mannuthy

This farm started in 1921 was transferred to the Kerala Agricultural University in 1972. The farm serves the needs of teaching, research and extension activities of the different departments of the College of Veterinary & Animal Sciences. The facilities available in the farms were utilised for imparting practical training to the students of the College as

well as for the short term training programmes conducted by the departments of Animal Management, Animal Nutrition, Animal Genetics and Breeding, Animal Reproduction, Dairy Science etc.

The farm maintained a herd of cross-bred cattle of Jersey, Brown Swiss and Holstein. The total herd strength as on 31-3-1985 was 227 comprising of 115 milch cows, 32 dry cows, 40 dry and pregnant cows, 5 heifers, 25 female calves, 6 male calves and 4 bullocks. During the year 158 calves, were born and 78 animals were culled. The total milk production for the year was 225503.5 litre with an average of 618.0 litre per day.

2.1.2 Fodder Research and Development

The total area available for fodder production was 69 ha. A quantity of 3011.3 t of fodder consisting of grass, leaves, maize and silage was produced and the value of this was estimated to be Rs. 669604.70.

2.1.3 Pig Breeding Farm, Mannuthy

The Pig Breeding Farm, Mannuthy, was started in 1965 with an area of 4.2 ha. The main objective of the farm are to conduct research in various aspects of swine production, to serve as a demonstration unit for farmers and an instructional unit for the students and to distribute good quality piglets to the farmers. A total of 962 piglets were produced and 706 distributed during the year. The distribution of piglets was as follows:—

Public—484; Meat products of India—94; PDO/DRDA—126 and for research work—2

2.1.4 University Poultry & Duck Farm, Mannuthy

The Poultry Farm, Mannuthy, of the State Animal Husbandry Department was transferred to the Kerala Agricultural University in 1972. The major objectives of the farm are to provide hatching eggs, chicks and breeders for farmers and Development Departments, to provide the necessary facilities for teaching the students and to undertake research in various aspects of poultry production.

The major activities of the farm during the year were:

A total of 387032 eggs were produced.

9199 birds were supplied to poultry farmers for breeding purpose

Under the Lab to Land programme 2701 birds were supplied.

A total of 25172 chicks were hatched out.

Japanese quails and tortoises were maintained for instructional purposes.

Research schemes on quails and tortoises were initiated.

Vaccine amounting to Rs 11 800 was supplied to the farmers.

The total number of birds as on 1-4-1984 and 31-3-1985 were 6692 and 5583 respectively with an average per day egg production of 65.43.

2 1 5 AICRP on Poultry for Eggs

All India Co-ordinated Research Project on Poultry for Eggs at Mannuthy Centre was sanctioned by the ICAR in November 1976 with the following objectives:

To evaluate germplasm of White Leghorn chicken allotted to the Centre for their productive performance

To improve their genetic potential by adopting advanced breeding techniques and

To study the feasibility of developing a commercial layer chick either by pure line selection or by strain crossing

The Centre started working with three strains of White Leghorn, namely IWN, IWP and IWO. The F strain of White Leghorn which was maintained in the University Poultry farm was also added to the programme. However, subsequently due to the poor performance of IWO and for want of sufficient testing facilities work on IWO and F strains was dropped. Thus currently the centre is working with IWN and IWP strains. These strains had undergone four generations of testing and selection. Strain crosses of IWN, IWP & F were also produced for assessing the strain cross performance

During 1984-85, S5 generations of both IWN and IWP strains were raised and tested for their per year production. Reciprocal crosses making use of the two strains corresponding to S5 generation were also raised. IWN x IWP cross was exposed to testing at Anand testing centre of AICRP (Poultry). The data is being processed

The preliminary scanning of the data indicate that S5 generation of IWN has improved its productivity of egg over S4 generation by 8.6 eggs. The egg weight has also improved by 1.4g in IWN and 0.4g in IWN. Likewise the age at first egg has also advanced by 10.9 days in IWN and 8.9 days in IWP strains. Thus there has been an overall improvement in most of the traits in S5 generation as a consequence of selection. The performance of reciprocal crosses indicated that the cross IWN x IWP had an egg number of 227.7 in 500 days of age while that for IWP x IWN was 209.4 for the same period suggesting IWN x IWP as a promising strain cross for commercial exploitation.

Ad hoc Project of Nutrient Requiremant of Caged Layers

An adhoc research project on "Nutrient Requirement of Caged Layers" was sanctioned by ICAR for 3 years and was started on 7-5-1984. The objectives of the project are,

To study the dietary requirements of protein, energy, calcium and phosphorus for layers maintained in cages and,

To examine the requirements of lysine and methionine for caged layers.

One hundred and ninety two ready-to-lay strain cross pullets (IWN x IWP) were randomly allotted to 16 dietary treatments with four replicates per treatment. The dietary treatments were all possible combinations of four energy levels, namely, 2400, 2500, 2600 and 2700 K Cal ME/kg and four levels of protein, namely, 14, 16, 18 & 20%. The data on body weight maintenance, egg production, feed intake, livability, egg quality have been recorded for six 28 day periods and collection of data for the balance six 28-day periods in progress.

2.1.6 AICRP on Goats, Mannuthy

The All India Co-ordinated Research Project on Goats for milk production started in September 1972 continued during the year with the object of evolving a new milch breed of goats suited to the agro-climatic conditions of Kerala and capable of yielding higher quantities of milk in a lactation. Though the initial target of milk production was fixed as 300 kg in 150 days, it was subsequently modified to 180 kg in 120 days taking into consideration the humid climatic conditions of Kerala State. It was envisaged to evolve such a breed by cross breeding local Malabari breed with exotic breeds, Saanen and Alpine.

There were 591 goats at the beginning of the year and the stock was 545 at the end of the year. The milking does which was 99 at the beginning increased to 121 at the end of the year. During the year a total of 239 kids were born. The total quantity of milk produced was 21970 90 kg and the average milk production per day was 60 20 kg. The number of bucks distributed for breeding purpose was 97. The centre conducted a total of 2299 artificial inseminations for the year.

The Archbishop of Trivandrum visited the goat project on 19-9-84 and 21-11-84 and the Bishop of Trichur on 24-9-1984.

Dr R. K. Misra, Project Co-ordinator, visited the project from 3rd ot 7th January, 1985 and evaluated the working of the project. Dr. Tilman U. S. A. I. D. made a visit to the form on 22-1-1985.

Two research projects, viz. (i) Inheritance of certain qualitative traits in goats and (ii) Comparative evaluation of different genetic groups of goats for growth, reproduction and production performance were in operation.

A training programme on goat rearing was conducted for the workers of Gandhi Smarak Nidhi from 25th to 30th June, 1984.

Dr. B. R. Krishnan Nair attended the VIII Workshop of AICRP on Goats from 13th to 15th March, 1985 at Rajasthan. He also visited the Govt. Goat Farm at Komeri and prepared a detailed report suggesting improvements in the working of the farm.

2.1.7 AICRP on utilisation of agricultural by-products and industrial waste

The All India Co-ordinated Research Project on utilisation of agricultural by-products and industrial waste commenced on 1-8-1967

was continued during the year. With the objectives of survey and collection of data on agricultural by-products, availability, analysis of by-products for the chemical composition, palatability, physical, chemical, biological treatments of by-products, lactative and nutritive value, conduct of feeding trials incorporating the by-products and evolving economic livestock rations.

During the year canning waste of fish industry was collected and analysed for the chemical composition. Finding it to be good source of animal protein, feeding experiments in single stomached animals were envisaged.

Long term lactation study incorporating coir pith at 20% level was completed. Twelve crossbred cows after their peak lactation were divided with two groups and fed with concentrate mixture containing 0 and 20% coconut pith. It was noticed that there was no significant difference in average daily yield of milk and efficiency of milk production between the groups.

Urea treatment of paddy straw on laboratory scale was done. It was concluded that a period of treatment of 15 days was sufficient for the release and fixing up of ammonia. The percentage of added N loss increased over periods. There was a decrease in lignin content at 15th, 30th and 45th day.

Long paddy straw treated with 4% urea to reach a moisture level of 45% was stacked and covered with polythene sheet. The straw preserved like this was golden yellow in colour, soft with no fungal growth and good strong ammoniacal smell. Attempts were also made for ensiling paddy straw treated with urea to improve the nutritive value of straw.

2.1.8 Veterinary Hospital, Trichur

The Veterinary Hospital, Trichur, was used for giving practical training in various aspects of clinical diagnosis and treatment of animals to the students of the BVSc & AH classes. The post graduate students made use of the facilities available for collection of materials for the research work carried out by them. The Hospital gave veterinary aid to the animals in and around Trichur and gave them protective vaccination against infectious diseases. Advanced techniques and modern trends in the field of veterinary medicine and surgery for the diagnosis and treatments were adopted. Specialists from the different clinical and para-clinical departments of the College of Veterinary & Animal Sciences attended the hospital regularly for imparting efficient training and to provide the best veterinary aid. A clinical laboratory and an artificial insemination centre continued to function in the hospital premises.

A total of 23869 outpatients were treated and the average daily attendance was 66. A total of 91 major and 972 minor operations were

performed in addition to the 35 contractions. The number of preventive vaccinations done against rabies was 81 and a total of 9038 birds were treated/vaccinated.

2.2 LIVESTOCK RESEARCH STATION, THIRUVAZHAMKUNNU

This farm originally established in 1949 by the Government of Madras was transferred to the Kerala Agricultural University in 1972. Subsequently the farm was converted into Livestock Research Station, in August, 1978. The Research Station has a total area of 163.3 ha of which 84.37 ha is under fodder crops. The main objective is to conduct research work on scientific breeding and management of livestock. During the year a total quantity of 128 tonnes of milk was produced. The amounts of green fodder, silage and hay was 2000, 320 and 90 tonnes respectively. Facilities of artificial insemination and veterinary aid were provided by the staff to the farmers in the neighbouring areas.

2.3 CATTLE BREEDING FARM, THUMBURMUZHI

This farm originally started by the State Animal Husbandry Department was transferred to the Kerala Agricultural University in 1972. The farm has an area of 25.2 ha out of 18 ha were under fodder cultivation. The main varieties of grasses grown are Guinea, Improved guinea, Napier, Hybrid napier and Para. Coconut cultivation was also started during the year.

The main objectives of the farm are to rear weaned calves, artificially breed them and supply as pregnant heifers to the University Livestock Farm, Mannuthy. The farm is also engaged in conducting basic and applied research on cross bred calves. The facilities such as artificial insemination, veterinary aid and supply of improved varieties of fodder grass slips were made available to the farmers in the surrounding areas. A total of 1619 tonnes of fodder was produced during the year.

The total number of animals at the close of the year was 198 and the farm supplied 60 animals to the University Livestock Farm, Mannuthy.

Research Highlights

ANIMAL DISEASES

The role of free flying birds which have ready access to poultry reared in free range system in the dissemination of ND was established. A new vaccine strain (NDV-M) was evolved and characterized. It has been tried extensively under field conditions and found to be quite satisfactory in its immunogenic properties. More than 65800 doses of the vaccine have been so far used for this purpose. There was no significant post vaccinal reactions among the vaccinated birds.

The role of paramyoviruses in inducing disease conditions similating to that of ND is strongly suspected. The often reported outbreaks of

ND/ND like disease among the vaccinated birds, and the isolation of some the haemagglutinating viruses other than NDV from ducks manifesting severe respiratory distress warrants attention.

Autovaccines prepared from cases of warts in bovines was found to be quite effective in curing the condition.

Clostridial infection among goats (enterotoxaemia) was diagnosed and vaccination advised.

Mortality, abortions and still births among guinea pigs in the Small Animal Breeding Unit, KAU was diagnosed to be due to infection with *Salmonella typhimurium*.

Salmonella gallnarum infections among turkey and chicken were identified and control measures suggested.

Isolation of *Morexella nonliquefaciens* from cases of respiratory tract infections of rabbits similating to that of Pasteurellosis was an interesting observation. Experimental infections with this bacteria have shown that it can reproduce the condition by intranasal, subcutaneous or by oral administration.

Analysis on the incidence of mastitis among animals in Kerala have shown that the highest incidence of mastitis was during June to September. The frequency of organisms in the decreasing order were Staphylococci, Coliforms, Streptococci, Corynebacterium, yeast, gram positive bacilli and Pseudomonas. The highest incidence of Staphylococcal mastitis was during the months of June to September, while coliforms rated first during February to May. The antibiotics of choice for staphylococci were gentamycin and chloramphenicol; for coliforms neomycin, gentamycin, septran and chloramphenicol, for streptococci ampicillin, chloramphenicol, and penicillin; for corynebacterium neomycin and gentamycin and for gram positive bacilli gentamycin and chloramphenicol.

Actinobacillus suis was isolated from a case of chronic generalized lymphadenitis in a buffalo. An antigen has been prepared from this isolate for serodiagnosis of *Actinobacillus suis* infection among animals.

Yersinia pseudotuberculosis could be isolated from cases o abortions in goats. Its abortion inducing character is being studied.

Leucocyte migration inhibition and allergic skin test employing exotoxin were found to be be useful for demonstration of cell mediated immune responses and early diagnosis of *Corynebacterium pseudotuberculosis*. infection in goats.

The effect of RDVM vaccine on egg production has been compared with a known vaccine strain (R2B) and another unvaccinated control group. There was no difference in the rate of egg production for the first three weeks following vaccination between these groups.

The antibody titers in the serum of hens were comparable to the titer in the yolk of eggs laid by these birds and in the serum of chicks hatched out from these eggs.

Counter immuno electrophoresis for rapid diagnosis of rinderpest has been standardised and being routinely used for the diagnosis of this disease.

Two dimensional electrophoresis technique has been standardised and is being used for studying the various constituents of antigens.

The role of spermatozoal antibodies in causing repeat breeding in cows reported to be not suffering from any other infection has been suggested by demonstrating these antibodies in their sera and or vaginal mucus.

The pox virus isolated from infectious otorrhoea in buffaloes is being characterized and adapted in developing chick embryos to evolve a vaccine strain.

The normal microbial flora in the alimentary and respiratory tract of Japanese quails are being studied.

It was observed that acepromazine if used for immobilization when ambient temperature is high is likely to produce photosensitization. This was observed in certain elephants. But however xylozine hydrochloride alone in sufficient dose produced satisfactory results.

Anaesthetic dose to perform surgical procedure in lions with xylozine hydrochloride and ketamine alone was achieved. It was also observed that a combination of these two produced very high synergestic as well as more satisfactory results than either of these two used as a single agent.

Thirty seven serum samples out of the 1377 tested were found to be positive for brucellosis. So there is a prevalance of brucellosis to the extent of 2.7% among the domestic animals of Kerala.

Hanging pincast was adopted as a method of immobilisation in fracture of tibia in two clinical cases. The method was found to be satisfactory.

Endoxan has therapeutic value in early cases of ethmoid carcinoma.

Natural cases of poisoning by chela leaves were encountered in different parts of the state and by experimental studies in calves their susceptibility was established. There were significant changes in the brain which could be attributed to nervous symptoms in this poisoning.

CATTLE AND BUFFALOES

Water hyacinth wilted to 30% dry matter was found to be suitable for making silage. At 15% dry matter, it was found to be suitable for making silage mixing with other dry fodder like paddy straw.

Coconut cake was found to be more resistant to rumen degradability and formed a good source of bypass protein as compared with groundnut cake, gingelly cake and rubber seed cake. Gingelly oil cake and rubber seed cake were found to be possessing highly degradable proteins. Heat treatment was found to more effective than formaldehyde treatment in reducing degradability Solubility of protein and degradability were found to have a positive corelation.

Hypothyroidism in calves was found to cause reduced feed intake reduction in growth rate and alopecia

GOAT

Goats were demonstrated to be relatively refractory to poisoning by cheka leaves

Nephritis was found to be an important factor responsible for paresis in goats

A study on Polymorphism of Haemoglobin, transferrin, albumin, and amylase in Malabari and its exotic crosses revealed that two types of haemoglobin viz. Hb^A and Hb^B existed in the population and out of the two Hb^A occured in higher frequency. Albumin and amylase did not exhibit any polymorphism For transferrin, four different phenotypes controlled by three Co-dominant alleles Tf^A, Tf^B, and Tf^C were observed. A significant favourable association was observed between Tf^{AA} and economic traits indicating the possibility of using transferrin as a genetic marker in the selection of goats for improved milk production.

POULTRY

Rainy season seems to be a more advantageous season for broiler production. Increasing floor allowance than that currently recommended showed better performance in broilers.

Autoimmune thyroiditis was induced in chicken and the pathogenesis of the condition was delineated and the pathology described.

Allergic encephomyclitis was induced in chicken and pathological features were described.

Oxytetracycline was found to cause significant pathological changes in the developing chick embryo.

Tuberculosis was encountered in ducks and the liver and spleen were identifed to be the target organs in this species.

The distribution of mast cells in the tissues of ducks and their significance in the biology of tissue reactions was brought to light.

The ultrastructure of the mast cell in the duck was described for the first time.

3. FACULTY OF FISHERIES

3.1 COLLEGE OF FISHERIES, PANANGAD

The College of Fisheries was started during the academic year 1979-80 at Mannuthy. On 25-5-81 it was shifted to Panangad. The College offers a four year degree programme leading to the degree of Bachelor of Fishery Science (B. F. Sc.), following the trimester system of teaching. The intake capacity is 30 students per year, of which 9 seats are reserved for the children of fishermen. The intake capacity has now been reduced to 20 per year. During the year under report, post-graduate course (M. F. Sc.) was sanctioned in the faculty in the disciplines of Aquaculture and Fishery Biology, with a total intake capacity of 8 per year.

The construction works started earlier in the campus have made further progress during the year. A dining hall has been added to the Men's Hostel. A basket ball court and a volley ball court have been prepared in the campus during the year. Construction of 15 nos. of staff quarters and the 4th semi-permanent academic block has almost been completed. A temporary thatched shed of 125m² has been constructed for conducting research. A training-cum-research vessel 'Matsya-I' of 13.27 M. O. A. L has been acquired by the College during this period.

Departments

Dr. M. J. Sebastian continued as the Dean (Fisheries). There were 7 departments viz., Department of Aquaculture, Fishery Biology, Fishery Hydrography, Fishing Technology, Fishery Engineering, Fish Processing Technology and Management Studies under the Faculty. The College has its Instructional Farms at Panangad and Puduvypu.

The scientific staff consisted of the Dean, 4 Professors, 12 Associate Professors, 22 Assistant Professors and 18 Junior Assistant Professors. In addition, 9 Research Fellows worked under the various research schemes.

New post sanctioned during the year

The following new posts were created during the year.

Associate Professor	(Aquaculture)	2
	(Fishery Biology)	1
	(Biol. Oceanography)	1
Assistant Professor	(Gear Technology)	1
	(Statistics)	1
	(Economics)	1
	(Business Management)	1
Junior Asst. Professor	(Aquaculture)	1
	(Fishery Biology)	1
Junior Asst. Professor	(Limnology)	1

Nine posts of Research Fellows were created provisionally for the year on a consolidated monthly emolument of Rs. 900/- w. e. f September, 1984.

Posts shifted during the year

The post of Assistant Professor (Ichthyology which was shifted to College of Agriculture, Vellayani, earlier continued to be at Vellayani, during the year.

Changes in personnel

During the period under report Sri. P. Radhakrishnan Nair joined as Associate Professor (Fish. Technology). Mrs Lizy Behanan, JAP (Nutrition), Dr. Anna Mercy, T. V. (JAP-Aquaculture) and Dr. M. C. George, Asst. Professor (Fish. Microbiology) joined the College.

Faculty Improvement Programme

Miss Elizabeth Joseph, Junior Assistant Professor, who was granted study leave for 3 years w. e. f. 15-10-1983 for undergoing Ph. D. course and Sri. Sajan George, Jr. Asst. Professor who was granted study leave in 1981 for undergoing Ph. D course continued to be on leave during the year.

Details of Sominars/Symposia/training programmes etc. conducted/participated

Under the extension education programme, a farmer's training programme was conducted in collaboration with Kuttanad Integral Development Society and Ramankari Service Co-operative Bank at Ramankari during the period 21-6-84 to 27-6-84. Eighteen farmers from Kuttanad underwent the training. The farmers were trained in the theoretical and practical aspects of carp breeding and rearing of seed during this period. 6.7 lakhs of carp seed were produced and distributed during the programme.

Under the auspices of the Employment Information & Guidance Bureau, Kerala Agricultural University, a Seminar on 'Employment for Fishery Graduates' was held at the College on 21st July, 1984. The Seminar was inaugurated by Sri. Ramakrishnan, I. A. S, Developement Commissioner, Free Trade Zone, Thrikkakkara. Sri. V. K. Krishnan, Divisional Employment Officer, Ernakulam, spoke on the occasion. Papers on various aspects related to the career opportunities for fishery graduates were presented in the Seminar by Scientists from the University and Central Marine Fisheries Research Institute, Cochin.

Dr. M. J Sebastian, Dean, participated in the workshop on 'Shrimp Farming' organised by the Department of Fisheries, Kerala at Cochin on 2nd and 3rd May, 1984. He also chaired the opening and plenary

sessions. Sri. P. S. Mrithunjayan, Assistant Professor attended the summer institute on 'Application of Indigenous Electronic Instruments in Fishing and Fisheries Science' sponsored by the ICAR at Central Institute of Fisheries Technology, Cochin from 17th May, 1984. Sri. K. G. Balakrishna Pillai, Administrative Officer attended the National Workshop on "Planning and Designing Training programme for Adult Education", Govt. of India at Viswabharathi (WB) from 5th to 12th April, 1984. Dr. M. J. Sebastian, Dean attended the ICAR Fisheries Expert Panel meeting on 2nd and 3rd July, 1984 held at the ICAR Headquarters, New Delhi. He also attended the ICAR Regional Committee No. 8 on 9th and 10th July, 1984 held at Coimbatore. Dr. B. Madhusoodana Kurup, Junior Assistant Professor attended the training programme on 'Acoustic Method for Fish Detection and Abundance Estimation' conducted by Central Marine Fisheries Research Institute, Cochin from 12th to 25th September, 1984. The Dean, Professor of Fisheries Research, Heads of Departments of the College, Dr. K. Jayasree and Sri. C. G. Rajendran attended the seminar on 'KAU 2000 AD' held at Vellanikkara from 22-d to 24th November, 1984. The Dean, Professor of Aquaculture and Professor of Fisheries Research presented a paper each in the seminar. Dr. P. M. Mathew, Professor of Fisheries Research, presented a paper and participated in the workshop on "Problems of Transfer of Technology in Aquaculture" held at National Institute of Rural Development, Hyderabad from 21st to 23rd of November, 1984. Dr. T. M. Jose and Sri. P. M. Sreerajan, Assistant Professors attended the symposium on "Comparative Endocrinology," held at Banaras Hindu University, Varanasi, from 29th to 31st of December, 1984 and presented a paper each. Dr. M. J. Sebastian, Dean and Dr. P. M. Mathew, Professor attended the seminar on "Investment opportunities in Prawn Farming" held at Cochin on 2-1-1985, organised by Indian Bank, Madras, Directorate of Fisheries, Trivandrum and Marine Products Export Development Authority. Sri. K. G. Balakrishna Pillai, Administrative Officer participated in the 5th National workshop of All India Co-ordinated Tribal Area Research Programme held at Trivandrum from 18th to 22nd February, 1985. Dr. M. J. Sebastian, Dean attended the ICAR Fisheries Export Panel meeting on 2nd and 3rd July, 1984 at the ICAR Headquarters, New Delhi. He also attended the meeting of the ICAR Regional Committee No. 8 on 9th and 10th July, 1984 at Coimbatore. The Dean attended the Indian Sea Food Trade Fare held at Bangalore on 8th and 9th February, 1985. Dr. P. M. Mathew, Professor underwent the training course in Audio Visual Aids and Communication Media conducted at Communication Centre, Mannuthy, during the period 18th to 23rd February, 1985. He gave a talk on 'fish culture' during the Rice Day and Karshika Mela celebrations at Rice Research Station, Moncompu on 4-3-1985. He also conducted a class on fish and prawn culture on 27-3-1985 at Rice Research Station, Vyttila during the training programme arranged for the farmers under Lab to Land and Village Adoption Programmes.

Academic programmes

		Strength of students		
		Men	Women	Total
U G Course				
I year	1984 batch	23	9	32
	1983 batch	19	7	26
II year	1982 batch	21	4	25
III year	1981 batch	17	9	26
IV year	1980 batch	16	9	25
	1979 batch	6	—	6
	Total	102	38	140
Students from outside the State				
	Sri Lanka	1	—	1
	Jaffna	1	—	1
	Total	2	—	2
No of students who obtained their degree during the year		10	8	18
P G Course				
	Admitted	2	3	5

Practical training programmes

The First year B F Sc students were taken on board the CIFT fishing vessels 'Sraddhumati' and 'Matsyakanya' during the period 3-4-1984 to 27-4-1984 and 10-6-84 to 31-5-84 as part of the 2 'Work Experience' programme.

The 1981 batch of B F Sc students were taken to Freshwater Biological Station, Malampuzha during the period 14-6-84 to 20-6-84 for field experience in Aquaculture-I. Four students of the 1979 batch were also taken to Malampuzha during the above period for 'Work Experience' in aquaculture.

The 1983 batch of B. F. Sc. students were taken to Peechi during the period 18-6-84 to 25-6-84 for the swimming practice while the 1983 batch were given the training during 26th November to 3rd December, 1984, under the supervision of Sri. P. N. Gopinathan Pillai, Swimming Coach, District Sports Council, Trichur.

Study tour

Study tours were conducted for the 1980 and 1981 batches of B. F. Sc. students during the report period. Students of the 1980 batch were taken to Madras, Porato Novo, Mandapam, Rameswaram, Tuticorin, Cape Comorin, Vizhinjam and Neendakara during the period 26-2-85 to 10-3-85. 1981 batch students visited Calicut, Mangalore, Mysore, Ooty and Madras during the period 18-2-85 to 1-3-1985.

Scholarships and aids to students

Name of scholarship, award / aid	*No. of receipients*
Educational concession to SC students	2
Educational concession to OEC Christian convert students	15
Educational concession under KPCR	17
Fisheries Scholarships	3
National Merit Scholarship	4
KAU Merit Scholarship	3
Govt. of India Merit-cum-means Scholarship	1
Educational concession from Manipur Govt.	1
Dr. Kunjan Pillai Memorial Endowment	1
Total	47

Extra-curricular activities

The valedictory function of the Students' Union 1982-83 and a function to felicitate the outgoing first batch (1979-83) students were held in the College on 6th July, 1984. Sri. T. K. A. Nair, IAS., Chairman, Marine Products Export Development Authority, Cochin, delivered the valedictory address and gave away the gold medal donated by the teaching staff of the College to Miss Susoola Mathew, 1st rank holder of the 1979-83 batch. Dr. C. P. Kurian, Emeritus Scientist, Central Marine Fisheries Research Institute, Cochin addressed the gathering and distributed the prizes to the winners of the various competitions conducted by the Students' Union.

The Students' Union activities for 1984-85 were inaugurated by Sri. T. Hariharan, Chairman, Kerala Fishermen Welfare Corporation in a function held at the College on 20-11-85. Sri. Balachandran Chullikkad noted Poet, inaugurated the Arts Club on that occasion. The Planning Forum was inaugurated by Dr. [illegible], Head of the Department of Applied Economics, University of Cochin. Dr. N. R. Menon, Head of the Department of Marine Biology and Biochemistry, University of Cochin gave the felicitation address on the occasion. Inter class arts competition was held at the College during the period 19th to 22nd November, 1984.

Fourteen students of the College participated in the inaugurating function of the 8th KAU Students' Union held at the College of Veterinary and Animal Sciences, Mannuthy on 27-2-1985.

During the year under report the NSS volunteers of this College were exposed to the non formal education classes. Several uneducated adults including women made use of the evening classes conducted by the volunteers. Some persons who had basic education, attended non formal classes in English language handled by the volunteers. The NSS Unit consisted of 74 volunteers.

A sample survey was also conducted by the volunteers around the area where the non formal classes were held, to get information regarding the education level and income particulars of selected families. Several NSS volunteers donated blood as and when requests came from various hospitals in and around Ernakulam. World Literacy Day was celebrated by conducting a seminar on the subject which was attended by several dignitaries like Sri P. N. Panikkar of KANFED, Sri. K. G. Balakrishna Pillai etc. The volunteers also participated in the social forestry programme. They planted and distributed several saplings. The NSS Programme Officer attended the University Level Advisory Committee Meeting held on 20-9-84 at the University Headquarters. The volunteers cleaned the premises of the College as a one day programme.

Prof. M. P. Mammathan, visited the college on invitation and gave a talk on the Youths' role in solving different social problems. This talk was arranged as a part of youth week celebrations.

The College hockey and football teams participated in the Inter-collegiate competitions held at Veterinary College Campus, Mannuthy from 12th to 14th July, 1984. Eight students of the College participated in the Inter collegiate athletic meet held at College of Agriculture, Vellayani on 25th and 26th August, 1984.

The Inter class competitions in shuttle badminton and ball badminton were held at Pananged during the second week of November, 1984. Mr Johnson K. L. and Biju I.I Oommen represented the College in the table tennis tournament organised by Lakeel Club, Fort Cochin on 19th and 20th November, 1984. The table tennis (men), shuttle badminton (men) and shuttle badminton (women) teams of the college participated in the KAU table tennis and shuttle badminton tournaments conducted at Mannuthy on 6th and 7th December, 1984. The table tennis team (men) secured the 1st place and won the KAU trophy for the year 1984. The shuttle badminton team (women) were the runners up for the year 1984.

Hostel

The Mens' Hostel at Pananged campus has started functioning on 14-5-1984. 72 of the boys were accommodated in the hostel, while 10 students were accommodated in a rented building in the town, in the absence of space in the hostel building. The Dean functioned as the Warden. As Dr. M. C. George is away on deputation, Sri. Syed Ismail Koya, Asst. Professor held the charge of Assistant warden. Sri. N. N. Raman, Junior Assist. Professor continued as Resident Teacher. The girl students were accommodated in approved hostels like the YMCA and the Athurasramam Working Womens' Hostel. Thus, accommodation was provided for 82 boys and 28 girls at the University's expense.

College Library

	as on 1–4–84	as on 31–3–85
Books	5580	5759
Journals	57	62

3.2 INSTRUCTIONAL FARM/FISH FARM AT PANANGAD & PUDUVEYPU

In addition to the fish ponds (0.43 ha) available at Panangad, an Instructional Farm of 101 ha has also been established at Puduveypu. At Panangad 3.5 ha private land had been taken on lease at Rs. 47,500/- for prawn filtration.

Other Matters

The third meeting of the Faculty Research Committee (Fisheries) was held at the College on 20th July, 1984. The Committee reviewed the progress of the ongoing research projects under the faculty and approved 14 new research projects. The committee also recommended for the creation of a few posts of Research Fellows for the effective implementation of the research programmes under the Faculty 1st meeting of the reconstituted Board of Studies (Fisheries) was held at the College on 12-9-84. The Board recommended the starting of Master's Degree (M.F.Sc.) programme under Faculty of Fisheries, majoring in the disciplines of Aquaculture and Fishery Biology. The syllabi for the M. F. Sc. degree programme were approved by the Board.

Important Visitors

The important visitors during the period were Sri. S. Ramakrishnan IAS, Development Commissioner, Free Trade Zone, Thrikkakkara; Mr. M. C. Jacob, Director, Central Ground Water Board, (SIDA project) Trivandrum; Sri. T.K.A. Nair, IAS, Chairman Marine Products Export Development Authority, Cochin; Sri. T. Hariharan, Chairman, Kerala Fishermens Welfare Corporation; Sri. Balachandran Chullikad, noted Poet and Prof. M. P. Manmathan, eminent social worker and Sarvodaya leader.

Ongoing Projects

Seed resources survey of the giant freshwater prawn Macrobrachium rosenbergii

As in the previous years, from the survey conducted the prawn seed was not encountered in the collection sites –Puthotta, Murinjapuzha and Thanneermukkom in Vembanad lake, suggesting that the seed of this prawn do not concentrate in these areas.

Studies on the natural food organisms related to the growth of commercial prawns

The prawn *Penaeus indicus* kept in glass tanks were fed with *Marphysa*, a polychaete worm commonly found in brackishwater area, to find out its effect on the growth of the prawn. It has been found

that *P. indicus* attains an average weight increase of 2.1g per month, which when compared with its growth in natural conditions is very low. Feeding experiments with clams and amphipods are in progress.

Culture of some phytoplanktons

Chlorella, a green alga, was isolated from local freshwater ponds and cultured under laboratory conditions. *Chlorella* thus cultured was used for feeding *Moina* and *Brachionus falcatus* two important fish food organisms. For this the week old culture of *Chlorella* was used as an inoculum for the large scale culture in plastic lined pooles of 300 l capacity containing filtered pond and well water. The water was enriched by manures such as rice bran, groundnut cake, urea and single phosphate, respectively at the rates 100, 100, 12 and 24 mg/l. When the culture became slightly greenish *Moina micrura* was introduced into it @ 1 no/l, which reached a peak of 15,000 nos/l on 8th or 9th day. Likewise in a medium enriched with 100 mg/l poultry excreta, 12 mg/l of urea and 24 mg/l of phosphate, wherein *Chlorella* was cultured, *Brachionus falcatus* flourished giving a peak of 3.6×10^5 nos/l after 5 days of inoculation.

Studies on the use of Azolla in increasing the fertility of fish ponds

Azolla was cultured in artificial nitrogen free modified Bold's basal medium. After 20 days of growth the extracellular nitrogen fixed was estimated and it has been found that *Azolla* can exude substantial quantity of fixed nitrogen to the water.

Pituitary cytophysiology and reproductive endocrinology of some economically important fishes of Kerala

Field trials were conducted at Malampuzha Fish Breeding Centre with the objective of inducing spawning in *Cirrhinus mrigala* and *Labeo fimbriatus* using the synthetic analogue of the hypothalamine hormone LHRH (des Gly TD (D-Ala^6) LHRH ethylamide). This method was found effective. Further studies are in progress.

Study of variations in fish catch in relation to rainfall

It was found that there is a negative relationship between rainfall and the catch of oil sardine, while no specific relationship was found between rainfall and mackeral catch. Detailed statistical analysis of the data is being taken up.

From the preliminary screening for toxicity of *Croton tiglium* seeds *Sapindus* fruits (Pericarp) and *Hydrocarpus* oil cake it was found that the first two were effective in killing weed fishes respectively at concentrations of 20 ppm and 40 ppm within 3 hours when tested in laboratory. Yard and field trials are being carried out.

Studies on the durability of some species of timbers under marine conditions

Two species of timbers, viz., *Samadira indica* and *Strychnos nuxvomica* along with *Mangifera indica* as control were exposed at Panangad area of Vembanad lake and observations were made on the activity of organisms injurious to wood on these test panels. The results obtained so far indicated that these two species of timbers have greater resistance against the attack of marine wood boring organisms. While the control species was practically destroyed completely within 6 months of exposure, these two materials sustained only negligible damage from boring organisms.

Feeding experiments conducted with cholesterol deficient diet on *Penaeus indicus* showed that cholesterol deficiency inhibits growth and moulting. This indicates that cholesterol is nutritionally essential for *P. indicus*.

Fish and prawn culture along with paddy and after paddy in Pokkali fields

Culture of *Penaeus indicus* is being carried out in 2 Pokkali fields in Panangad campus. Peripheral and median channels of 1 m width and 50 cm depth have been made and a sluice has been fixed to regulate water flow. *P. indicus* of initial TL 13 mm has been stocked in the fields after proper preparation. No manuring or supplementary feeding is done in the field during the rearing period. The experiment is in progress.

Experiments conducted on the mixed culture of *Lates calcarifer* and *Tilapia massambica* in brackish water ponds showed that the former actively preys upon the latter, suggesting that *Tilapia* can be used as a forage fish for *Lates*.

Mixed culture of Lates calcarifer and Tilapia massambica in brackishwater ponds

The experiment initiated on the mixed culture of *L. calcarifer* and *T. massambica* in one pond of 500m² area in February, 1984 was completed in February, 1985 and the details are given below.

	L. calcarifer	*T. massambica*
Stocking rate	1000/ha	3000/ha
No. stocked	50	150
Initial size (mm/g)	105/42.5	220/180.0
Total wt. (kg)	2.35	20.65
Rearing period	12 months	12 months
No. harvested	17	45
Retrieval per cent	34	30
Final size (mm/g)	389/705.9	282/400.0
Total wt. (kg)	12	18

The low retrieval and non-availability of young ones of *T. mossambica* in the pond at the time of harvest showed that *L. calcarifer* was feeding on them. On the other hand, the poor retrieval rate of *L. calcarifer* may be due to the shortage of forage fish in the pond and the resultant cannibalism or natural mortality. Hence, in the culture of *L. calcarifer* with *T. mossambica* a forage fish, the 1:3 ratio is found to be inadequate to meet the food requirement of the former.

Survey of the seed resources of cultivable brackishwater predatory fishes in the Puduveypu area

The work was initiated in January, 1985. From the preliminary survey conducted only the seed of *Mugilops cyprinoides* was found available in this area, the maximum number collected being 72 nos/hour on 19-2-1985.

Polyculture of brackishwater fishes

The experiment was initiated in November, 1984 with the stocking of *Chanos chanos*, *Mugil cephalus* and *Liza parsia* in 1:1:1 ratio @ 5000/ha in four identical ponds. In pond 1 manuring alone is done with rock phosphate, urea and rice bran @ 100, 200 and 5000 kg/ha/year in equal monthly instalments. In pond 2 feeding alone is done with groundnut cake and rice bran in 1:1 ratio @ 5% body weight per day. In pond 3 both manuring and feeding at the above rates as in pond 1 and 2 are being done. The fourth pond is being kept as control without feeding and manuring. The experiment is in progress.

4. TECHNOLOGIES DEVELOPED AND ADVOCATED

During the year the following technologies were developed and included in the package of practices for the benefit of farmers.

4.1 FACULTY OF AGRICULTURE

Varieties Released

During the period the following new rice varieties were released for cultivation:

MO-7 Karthika

Recommended for growing in single and double crop wet lands in Kuttanad and in Onattukara during all the three crop seasons. This can be grown in other parts of the State as well. The duration of this variety is 115–120 days. The yield potential is 5423 kg/ha. This is tolerant to BPH and moderately resistant to sheath blight, sheath rot and BLB.

PTB-44—Reshmi

This is the awnless, photosensitive mutant developed from Oorpandy. It is recommended for growing in the second crop season where PTB-4 and CO-25 are grown. The advantages of this variety

are its tall stature, high photosensitivity with short bold red grains, non-lodging nature and higher grain yield. The variety is tolerant to saline conditions and can be grown in deep illdrained regions.

Vyttila-3

This is an improvement over Vyttila-1 and 2. It outyields Vyttila-1 by 20%. This variety has the same duration as Vyttila–1 and 2 and is suited to the Pokkali system of cultivation.

PTB-43—Swarna Prabha

This is a photoinsensitive variety suited for the Viruppu, Mundakan and Punja seasons and also for the modan cultivation and dry sowing in the Viruppu season. It is semi tall, high yielding white kernelled and of short duration. The duration is 100-105 days. This variety is resistant to blast and can be grown in uplands, palliyals and double crop lands in all the three seasons.

Kayamkulam-2 (Bhagya)

It is a photoinsensitive and highly resistant to the drought conditions in the first 30-35 days after direct sowing in the first crop season in the Onattukara region. The duration of this culture is 100 days. It outyields Jyothy and PTB-23. In MLT this variety gave 4000 kg/ha.

Kayamkulam-3 (Onam)

This is a photoinsensitive variety recommended for growing in the first crop season in the Onattukara region. It is highly resistant to drought conditions in the first 30-35 days after sowing. The rice colour is red and the duration is 95 days. This is moderately resistant to blight, sheath blight and false smut and moderately resistant to stem borer, leaf folder and case worm.

The following groundnut varieties were also released during the period:

ACV-1 (Soma)

Recommended for growing in rice fallows and in uplands in the Rabi season. It is white and bold seeded. The duration of this variety is 83 days in rice fallows and 87 days in Rabi uplands. It gives 700 kg yield/ha in rice fallows and 350 kg/ha in Rabi uplands. Oil content is 51.2%.

ACV-2 (Surya)

The duration of this is 87 days in Rabi uplands. Seeds are grey coloured. This variety is specifically recommended for growing in the Rabi season in uplands. The yield is about 350 kg/ha.

The following groundnut varieties (bunch) have been recommended for extensive growing in the State.

TG-3

Duration 100 to 110 days. Recommended for growing in summer rice fallows Yield 2745 kg/ha can also be grown in Kharif uplands.

TG-14

The duration of this variety is 105-150 days. This is also recommended for growing in summer rice fallows. The average yield of this variety is 2472 kg/ha. It can also be grown Kharif uplands.

Spanish Improved

Recommended for growing in the uplands during the Kharif season. The duration is 100-110 days. The average yield is 2326 kg/ha.

The cashew type Anakkayam-1 has also been released for cultivation in the State.

Anakkayam-1

This is a high yielding type selected from the seedling progenies of BLA-139 of Baptla. Apart from giving higher yield of nuts (mean 29.68 kg nuts/tree/year) this variety possesses some additional desirable attributes such as early flowering (October-November), short flowering phase (30 days) and early harvesting potential. The nuts are medium sized with shelling percentage above 28%.

Technologies Generated for Adoption

The following new technologies have been generated for adoption in the State

Optimum proportion for Virippu and Mundakan seeds for the Koottumundakan system

The proportion of 70:30 is recommended for the Viruppu and Mundakan seeds.

Conjunctive application of urea and carbofuran

Whenever carbofuran is needed at around 20 DAP in rice, Conjunctive application of carbofuran at 0.75 kg/ha and urea to supply 10 kg N/ha is recommended in hot spot areas for better protection from pests.

Control of weeds in kole lands

Application of benthiocarb at 1 kg ai/ha at 6 DAS is recommended for control of weeds in the kole lands.

Storage of rice seeds

Medium duration rice varieties if to be stored for periods up to 12 months and if short duration varieties are to be kept for 8 months, the seeds may be kept in polybags (700 gauge) without fall in viability below 80%.

Sheath blight control

Benomyl 500 g/ha is recommended for sheath blight control in rice.

Spray volume discharge rates for rice crop

Spray volume requirements for the rice crop at different stages have been standardised and specific pesticide application methods have been formulated.

Control of sheath blight and sheath rot of rice by applying higher doses of Potash and Carbofuran

Application of carbofuran 3% G at 35 kg/ha and keeping N:K ratio at 1:1.5 have been recommended for adoption in hot spots where sheath blight and sheath rot are serious endemic problems.

Seedling root dip in Chlorpyriphos

Dipping rice seedlings in chlorpyriphes 0.02% suspension for 12 hours is recommended for the control of gall midge, infesting rice.

Soaking rice seeds in Cu and Zn sulphate solution

Soaking rice seeds in a mixture of 1% zinc sulphate and 0.25% copper sulphate solution for 24 hours and keeping them for sprouting will help to increase yields.

Fertiliser recommendations for Mahsoori

An N P K dose of 50:25:25 kg/ha has been for Mahsoori variety as against the hitherto recommended dose of 70:45:45 of NPK/ha.

Water management practices for rice

For the second crop season wherever water scarcity is felt. application of 5 cm irrigation water once in 6 days is recommended.

Control of Cockchafer beetles in coconut

Specific recommendation of heptachlor and chlordane for cockchafer beetle control has been formulated.

Raising of rooted cuttings in pepper

Selection of middle 1/3rd portion of runner shoots has been recommended for planting in nurseries.

Seradix B2 for root inducement in pepper

Cut ends of vines are to be dipped in the dry powder formulation of Seradix B2 to induce rooting in pepper

Underplanting in pepper

Specific recommendations for underplanting in different varieties are given.

Fertiliser recommendations in cardamom

NPK recommendations are revised as 75:75:150 kg/ha.

Control of bacterial leaf spot of betelvine

Control with 1% Bordeaux mixture is recommended as a replacement of the antibiotic treatment.

Control of bacterial wilt in cassava

H-97, H-226, A-1687 and H 2304 have been found to be tolerant and these have been recommended for cultivation in disease prone situations.

Intercropping in pineapple in new cashew plantations

Pineapple has been found to be a promising intercrop for growing in young cashew plantations.

Waiting periods for insecticidal applications

The waiting periods to be allowed for recommended insecticides have been worked out.

Control of banana aphid

A recommendation to apply 2.5 g phorate 10 G at 25 g/plant first at 20 DAP followed by soil application at 95 DAP has been formulated for adoption in red banana.

Integrated control of pests and diseases in banana

Where the nematode, pseudostem borer and the rhizome weevil occur concurrently, application of 3 g carbofuran/phorate granules in the soil followed by spraying of any of the two materials in the leaf axils on 75 and 165 DAP is recommended.

Irrigation in Nendran banana

Specific recommendation for low water table situations is formulated.

Fertiliser recommendation for Nendran

Application of N in 5 split doses, P in 2 split doses and K in 5 split doses is recommended in Nendran bananas.

Intercropping in banana var. Nendran

Cucumber (*Cucumis melo*) is recommended as an intercrop for banana planted in September-October.

Recommendations in sugarcane

New recommendations on varieties, season, intercropping, plant protection have been formulated.

Recommendation of new fodder cowpea and guinea grass varieties

Fodder cowpea varieties UPC-5287 and UPC-5805 and PGG-4 of guinea grass are recommended for cultivation in Kerala.

The phytoplankton *Chlorella* isolated from local ponds and cultured in bulk in the laboratory was found to be a good feed for important zooplanktonic fish food organisms (*Moina* sp. and *Brachionus* spp.) A suitable technique for the mass culture of *Moina* and *Brachionus* was evolved during the period. *Moina* can be successfully cultured in plastic pools of 300 l capacity filled with pond water using manures such as groundnut cake (100 mg/l), rice bran (100 mg/l), Urea (12 mg/l) and single superphosphate (24 mg/l). *Brachionus* was cultured in a plastic pool filled with pond water using poultry manure (100 mg/l), Urea (12 mg/l) and single superphosphate (24 mg/l).

Azolla pinnata when cultured in artificial nitrogen free medium was found to release substantial quantity of nitrogen. This may be significance as culture of *Azolla* in fish ponds can help in reducing the quantity of nitrogen fertilization.

The larvae of *Mitrobathumrus nbergi* were successfully reared upto the 9th stage in plastic pools upto 23 days after hatching. During the period they were fed mainly on *Brachionus* and *Moina*.

In studies to identify promising alternatives to the currently used pituitary extract for induced breeding of fishes, a synthetic analogue of the natural mammalian hormone, LH-RH dissolved in 0.6% NaCl was found to be effective. In *Channa marulia* the females intramuscularly received a total of 80 mg/kg body weight and the males received 40 mg/kg. The hormone was administered in two injections 8 hours apart in females and in one injection in males. In *C. marulia*, there was complete spawning in females 12 hours after the second injection and the fertilization was 70%. In *Labeo fimbriatus*, the females were administered a total of 100 µg/kg and males 50 µg/kg body weight intra-peritoneally.

43 FACULTY OF VETERINARY AND ANIMAL SCIENCES

Field trials of the newly developed vaccine against the Ranikhet disease in chicken from a mesogenic strain of the virus isolated from a mynah was continued. A total of 2399 doses of the vaccine had been utilised during the year. The duration of immunity in birds vaccinated with this vaccine lasted for more than one year.

Studies on the virus isolated from cases of infectious Otorrhoea among buffaloes were continued. The virus isolate was at its 11th passage in chick embryos.

Salmonella spp. were isolated from 13.3% of the diarrhoeic piglets below 8 weeks of age. Two strains of *Salmonella gallinum* were isolated from chicken and turkey.

Antibodies to *Brucella abortus*, infectious bovine rhinotracheitis virus and spermatozoal agglutinins were detected in bovine serum samples to the extent of 51%, 20%, 16.25% respectively.

Selenosis was experimentally induced in eight cross-bred male calves. The toxic manifestation recorded were anorexia, loss of condition, anaemia, inability to stand, lack of rumination and finally death. Histopathological studies in organs collected from experimental animals revealed degeneration changes in liver, brain and cardiac muscle.

Arsenical preparation, essential fatty acid spplements and sodium thiosulphate proved effective as ameliorative and curative therapy for the necrosis of extremities in cattle and buffaloes.

A combination of Ketamine and Xylazine was found useful to produce immobilisation and surgical anaesthesia in a monkey.

Staphylococci could be isolated from 16.67% of the milk samples taken from cases of mastitis. These included both coagulase positive and coagulase negative strains.

CHAPTER III

Extension Education

All extension education programmes of the KAU are co-ordinated by the Directorate of Extension at the University level. The extension education programmes of the University are approved by the Extension Advisory Committee constituted by the University with the Vice-Chancellor as the Chairman.

Dr. A.G.G. Menon continued as the Director of Extension. Dr. G. R. Nair continued as the Associate Director of Extension.

The Directorate of Extension provides technical support to the field extension personnel of various development departments in the State, disseminates scientific and technological information to the farmers through a variety of media and offers technical assistance to voluntary service organisations and other institutions. The Directorate of Extension also designs and implements novel extension approaches for the transfer of technologies with a view that these approaches could be initiated by the Development Departments on a large scale.

The Extension programmes of the University are being implemented through the Training Service Schemes, Farm Advisory Service, Communication Centre, Krishi Vigyan Kendras, National Demonstration Scheme, Tribal Area Research Centre, Scheduled Caste Area Research Centre, Lab-to-Land Programme and Village Adoption Programme through various Educational Institutions/Research Stations under the University.

TRAINING PROGRAMMES

The following were the training programmes conducted in the various research stations and Educational Institutions under Kerala Agricultural University during the period under report.

Sl. No.	Name of the training	Venue	Date	No. of batches	No. trained
1	2	3	4	5	6
1	Advanced Training course in Disease Investigation for Assistant Directors/Veterinary Surgeons	College of Veterinary & Ani. Sciences, Mannuthy	23-4-84 to 21-7-84	1	7
2	Training in Lab. Techniques for the Livestock Assistants of the State Department of Animal Husbandry	-do-	26-3-84 to 25-9-84	1	5
3	Advanced Training in Biological Standardisation for Veterinary Surgeons of the State Department of Animal Husbandry	-do-	23-4-84 to 21-7-84	1	7
4	Advanced Training course in Veterinary Public Health for Asst. Directors/Vety. Surgeons of the State Department of Animal Husbandry	-do-	23-4-84 to 21-7-84	1	7
5	Advanced Training Course in Poultry Breeding and Genetics for Asst. Directors/Vety. Surgeons of the State Department of Animal Husbandry	-do-	23-4-84 to 21-7-84	1	7
6	State Level Training on Rice Production Technology for the JAO's Asst. Directors of the State Dept. of Agriculture	RARS, Pattambi	10-5-84 to 19-5-84	1	16
		Rice Research Station, Moncompu	8-10-84 to 11-10-84	1	24
7	Training in Plant Protection for JAO's of the State Department of Agriculture	College of Agriculture, Vellayani	18-6-84 to 23-6-84 20-8-84 to 25-8-84 10-9-84 to 15-9-84 24-9-84 to 29-9-84 14-1-85 to 10-1-85	5	132

8	Training on Goat rearing for the workers of the Kerala Gandhi Smarak Nidhi	AICRP on Goats, Mannuthy	5-6-84 to 30-6-84	1	7
9	Training in Dairying for pre-release Defence Personnel	College of Vety. & Animal Sciences, Mannuthy	2-7-84 to 31-7-84	1	12
10	Training in Agriculture, Animal Husbandry and Nutrition for Tribal Farmers	Directorate of Extension, Mannuthy	9-7-84 to 18-7-84	1	10
11	Training in Social Forestry for Asst Directors of the State Department of Agriculture	-do-	23-7-84 to 25-7-84	1	31
12	Training in Rice Production Technology for Agricultural Demonstrators of the State Department of Agriculture	RARS, Pattambi	23-7-84 to 28-7-84 20-8-84 to 25-8-84 27-8-84 to 1-9-84 24-9-84 to 29-9-84	4	
		RRS, Kayamkulam	23-7-84 to 28-7-84 20-8-84 to 25-8-84	2	320
		RARS, Kumarakom	10-9-84 to 15-9-84 24-9-84 to 29-9-84	2	
13	Training in Horticulture and Tree Planting for the staff of Southern Railway	College of Horticulture, Vellanikkara	30-7-84 to 4-8-84	1	10
14	Training in vegetable production for Agricultural Demonstrators of the State Department of Agriculture	-do-	30-7-84 to 4-8-84 15-10-84 to 20-10-84 4-2-85 to 16-2-85 12-2-85 to 16-2-85 19-2-85 to 23-2-85	5	175
15	Farmers' Training course in Post-harvest Technology	Directorate of Extension, Mannuthy	7-8-84 to 10-8-84	1	30

1	2	3	4	5	6
16	Training in Agriculture for Supervisors of Primary Land Mortgage Banks	College of Agriculture, Vellayani	2-7-84 to 30-7-84	1	16
17	Training in Plantation Crops for Junior Agricultural Officers of the State Department of Agriculture	College of Horticulture Vellanikkara	18-6-84 to 23-6-84 20-8-84 to 25-8-84 10-9-84 to 15-9-84 24-9-84 to 29-9-84 15-10-84 to 20-10-84	5	150
18	Training in Fodder cultivation for JAOs of the State Department of Agriculture	College of Agriculture Vellayani	21-6-84 to 23-6-84 1-11-84 to 3-11-84 7-11-84 to 9-11-84	3	90
19	Training in Vegetable cultivation for JAOs of the State Department of Agriculture	College of Horticulture Vellanikkara	10-9-84 to 15-9-84 24-9-84 to 29-9-84	2	60
20	Training in Identification and control of root knot nematodes in cardamom Nursery for field officers of cardamom Board	College of Horticulture, Vellanikkara	24-9-84 to 29-9-84	1	3
21	Training in Bio-fertilisers for JAOs of the State Department of Agriculture	College of Horticulture, Vellanikkara	24-9-84 to 29-9-84	1	30
22	Training in Dry land farming for the Asst. Directors of the State Department of Agriculture	Directorate of Extension, Mannuthy	8-10-84 to 12-10-84	1	29
23	Training in Water Management for the JAOs of the State Department of Agriculture	Agronomic Research Station, Chalakudy	15-10-84 to 2-10-84	1	30

24	Training in pulses and oilseeds for the Agricultural Demonstrators of the State Department of Agriculture	RRS, Kayamkulam	8-10-84 to 12-10-84 16-10-84 to 20-10-84 5-11-84 to 9-11-84 20-11-84 to 24-11-84	4	309
		RARS, Pattambi	26-11-84 to 30-11-84 10-12-84 to 14-12-84 18-12-84 to 22-12-84 1-1-85 to 5-1-85	4	
25	Training in Plant Protection for the Agricultural Demonstrators of the State Department of Agriculture	RARS, Pilicode	29-10-84 to 3-11-84 12-11-84 to 17-11-84 19-11-84 to 24-11-84 26-11-84 to 1-12-84	4	310
		College of Agriculture, Vellayani	15-10-84 to 20-10-84 29-10-84 to 3-11-84 11-2-84 to 16-2-84 18-2-85 to 23-2-85	4	
26	Training in Agriculture and Animal Husbandry for Tribal Leaders	Directorate of Extension, Mannuthy	28-10-84 to 11-12-84	1	30
27	Training in Dry land farming for JAOs of the State Department of Agriculture	-do-	29-10-84 to 4-11-84	1	30
28	Training in Pulses and Oilseeds for the JAOs of the State Department of Agriculture	Rice Res. Station, Kayamkulam	24-10-84 to 27-10-84 14-10-84 to 17-10-84 19-12-84 to 22-12-84 26-12-84 to 29-12-84	4	136
		College of Horticulture, Vellanikkara	1-1-85 to 4-1-85	1	

1	2	3	4	5	6
29	Training in Meteorology for the JAOs of the State Dapartment of Agriculture	College of Horticulture, Vellanikkara	12-11-84 to 17-11-84 19-11-84 to 24-11-84	2	60
30	Training in Fruit and Vegetable Processing for rural women	College of Horticulture, Vellanikkara	19-11-84 to 24-11-84 26-11-84 to 1-12-84 10-12-84 to 15-12-84 17-12-84 to 22-12-84 14-1-85 to 19-1-85	5	90
31	Training in Poultry Management for Pre-release defence personnel	College of Vety. & Ani. Sciences Mannuthy	3-12-84 to 3-1-85	1	16
32	Regional Workshop cum Training on Agricultural Journalism for the Subject Matter Specialists of the Department of Agriculture from the States of Kerala, Tamil Nadu, Karnataka, Madhya Pradesh and Maharashtra	Directorate of Extn. Mannuthy	10-12-84 to 15-12-84	1	25
33	Training in induced breeding of carps and hatchery production of fish seeds for the farmers	Ramankari, Alleppey Dist.	21-6-84 to 27-6-84	1	18
34	Training in Cashew Apple Processing for rural women	College of Horticulture Vellanikkara	4-3-85 to 8-3-85 22-4-85 to 27-4-85	2	30
35	Training in Audio visual aids for Teachers of Kerala Agrl. University	Directorate of Extn. Mannuthy	10-2-85 to 23-2-85	1	15
		College of Agri. Vellayani	14-1-85 to 19-1-85	1	11

36	Training in Extension Methods for JAOs of the State Dept. of Agriculture.	College of Agriculture, Vellayani	11-2-85 to 16-2-85	1	19
		Directorate of Extn., Mannuthy	25-2-85 to 2-3-85	1	24
37	Training in Cropping pattern for Asst. Directors of soil Survey of the State Department of Agriculture	College of Horticulture, Vellanikkara	18-2-85 to 21-2-85 25-2-85 to 20-2-85	2	17
38	Training in Social Forestry for Forest Ranges of the State Department of Forest	College of Agri Vellayani	4-3-85 to 8-3-85	1	12
39	Training in Broiler Production and Rabbit Rearing for rural youth under TRYSEM trainees	College of Vety & Ani. Sciences, Mannuthy	14-1-85 to 25-1-85	1	11
40	Training in Extension methods for Agri Demonstrators	Directorate of Extn. Mannuthy	14-1-84 to 20-1-85	1	26
41	Pre-service training in Agriculture for Agricultural Demonstrators	College of Agriculture Vellayani Institute of Agrl. Technology, Tavanur	4-6-84 to 3-12-84	2	78+52
42	Short-term training for workers of voluntary Agencies in Agrl. & Allied subjects	Directorate of Extn. Mannuthy	12-2-84 to 14-2-85	1	18 Kanfed workers
		College of Agri. Vellayani	19-3-85 to 21-3-85	1	19 ,,

COMMUNICATION CENTRE AND FARM ADVISORY SERVICE

The major objectives of the Communication Centre, Mannuthy and Farm Advisory Service located at Mannuthy are to provide information support to the extension personnel of the State Development Department, voluntary agencies, Farmers etc., on agricultural technologies through a a variety of media. Feature articles, questions and answers, technical publications, radio and TV programmes, exhibitions, correspondence courses etc. constitute the information support programmes of the centre. Collecting research results from other research stations in India and abroad and communicating to the departments concerned of the University is also one of the duties of the Communication Centre. The Communication Centre consists of the Information Unit, the Exhibition and Graphic Service Unit and the Publication Unit. A resume of work in communication centre during 1984–85 is furnished below:—

A. FARM NEWS SERVICE THROUGH DAILIES, PERIODICALS, RADIO & TV:

a) Newspaper programmes:

The following feature articles were published in leading Malayalam and English dailies and periodicals:

[illegible]	ദീപിക
[illegible]	മാതൃഭൂമി
തെങ്ങിനു വളമിടേണ്ട കാലയളവ്	,,
[illegible]	,,
കശുമാവിൻ തോട്ടത്തിൽ [illegible]	മലയാള മനോരമ
പച്ചില വളച്ചെടികൾ	ദീപിക
[illegible]	ദീപിക, ദേശാഭിമാനി
കരിമ്പിന് ചെംചീയൽ രോഗം	എല്ലാ പത്രങ്ങൾക്കും
തെങ്ങിനു ഒരു [illegible]	,,
ഒട്ടുപ്ലാവിൻ തൈ നടുക	,,
വളപ്രയോഗത്തിലെ അടിസ്ഥാന തത്വങ്ങൾ	ദീപിക
Ways to maintain productivity of coconut palm	The Hindu
പുരപ്പുറമ്പിലൊരു വീടും പുരയിടവും	മാതൃഭൂമി
പാടത്തെ പുളിരസം നിയന്ത്രിക്കുക	എല്ലാ പത്രങ്ങൾക്കും
ചുവന്ന പശിമരാശി മണ്ണിലെ തെങ്ങുകൃഷി നന്നാക്കാൻ ഒരു പാഠം	കേരളകൗമുദി
കേരള കാർഷിക സർവ്വകലാശാലയിൽ നിന്നൊരു പുത്തൻ നെല്ല്	മലയാള മനോരമ, കേരള കർഷകൻ
ചെടികളിൽ മരുന്നു തളിക്കുമ്പോൾ	എല്ലാ പത്രങ്ങൾക്കും
കുളങ്ങളിൽ മീൻ വളർത്തുക	കേരള കർഷകൻ
അടുക്കള മുററത്തെ കോഴി വളർത്തൽ	എല്ലാ പത്രങ്ങൾക്കും
ചക്ക വെറുതെ പാഴാക്കല്ലേ	,,

Vaccinate your animal	The Hindu
നമ്മുടെ നാടിനു പറ്റിയ നിലക്കടല ഇനങ്ങൾ	കേരള കർഷകൻ
പച്ചക്കറികളിലൂടെ വിഷം കഴിക്കണ്ട	എല്ലാ പത്രങ്ങൾക്കും
ഡെയിഞ്ച — നല്ലൊരു പച്ചിലവള,	എക്സ്പ്രസ്സ്
പച്ചക്കറികളിൽ മരുന്നു തളിക്കുമ്പോൾ	എല്ലാ പത്രങ്ങൾക്കും
തെങ്ങിൻ തോപ്പിൽ പൊറിലയും നടാം	വിക്ഷണം
നല്ല പച്ചപ്പായ തൈകൾ കിട്ടാൻ എളുപ്പവഴി	എല്ലാ പത്രങ്ങൾക്കും
ശുദ്ധജലം കിട്ടാൻ കുളവാഴ	മാതൃഭൂമി
	വാരാന്തപ്പതിപ്പ്
കുരുമുളകിന്റെ വിളവു കൂട്ടാൻ	മലയാള മനോരമ
ഹോർമോണുകൾ	
പഴങ്ങളും പച്ചക്കറികളും സംരക്ഷിക്കാനായി	മാതൃഭൂമി
മാർഗ്ഗം	
അമ്ലലവണത്തിന്റെ തിരിച്ചടികൾ	കേരളകർഷകൻ
മണ്ണറിഞ്ഞ്	മലയാള മനോരമ
കൂർക്ക കൃഷിചെയ്യാൻ	"
വളപ്രയോഗവും പുതയിടലും	ദീപിക
ഇഞ്ചികൃഷിയിൽ	
മണ്ണു പറിച്ച മീനുകൃഷി	മലയാള മനോരമ
വാഴയിൽ ഇലപ്പുള്ളി രോഗം	എല്ലാ പത്രങ്ങൾക്കും
Development programmes and media research	The communicator
Towards a rational approach in rice agronomy	The Hindu
A holy dip for better crop production	The Hindu
മെച്ചപ്പെട്ട ഉല്പാദനത്തിനായ്	എല്ലാ പത്രങ്ങൾക്കും
കാലിൽ കുളവാഴ ദിനം	"
തന്ത്രപരമായ തൊഴിലവസരങ്ങൾ	"
വാഴയ്ക്ക് മെച്ചമില്ല, നിലമൊരുക്കൽ	എക്സ്പ്രസ്സ്
കൂട്ടുവിള	
മുണ്ടകൻ കൃഷിരോഗങ്ങൾക്ക്	"
സാൻസിബാർ—പുതിയ ദിശ, വാഴ	എല്ലാ പത്രങ്ങൾക്കും
വെണ്ടയ്ക്ക് ഇനങ്ങൾ ചെറി	"
കാർഷിക ശാലയിൽനിന്നും പുതിയ	"
പച്ചക്കറിയിനങ്ങൾ	
സുരഭിയുടെ വിജയകഥ	മാതൃഭൂമി
കുളങ്ങളിൽ മീൻ വളർത്താൻ	"
മീൻ വിറ്റച്ച് പണം കൊയ്യാം	"
നെല്ലും മീനും ഒന്നിച്ച്	"
മീൻ വളർത്തുന്നവർക്ക് ധനസഹായങ്ങൾ	"
മീൻ വളർത്തൽ ശ്രദ്ധയനത്തിൽ ഒരു പുതിയ തൊട്ടി	"
മരച്ചീനി കേടാവാതെ സൂക്ഷിക്കാം	മാതൃഭൂമി
കേരളത്തിലെ കാർഷിക വികസനവും സർവ്വകലാശാലയും	"

തെങ്ങിനെ കുലയാട്ട്	
A new mechanical device to remove African payal	
ആഫ്രിക്കൻ പായൽ വാരാൻ ഒരു യന്ത്രം	
മൃഗങ്ങളെ മാത്രം ബാധിക്കുന്ന ന്യുമോണിയ	
വെള്ളാട്ടുകളിലെ മാരകരോഗമായ	
ന്യുമോണിയ രോഗത്തെപ്പറ്റി	
ഒരു പുതിയ വളപ്രയോഗരീതി	
രാസവളം കൂടുതൽ ഫലപ്രദമാക്കുന്നു	
Pneumonia, a deadly disease in goats	
മീൻ വളർത്തലിനെ കുറിച്ചുള്ള	
ഒരു ലേഖനം	
തെങ്ങിൽ വിരുപ്പ് രോഗത്തിനെതിരെ	
ചിരട്ടത്തവി ഉപയോഗിച്ച് ഒരു പോർട്ടബിൾ	
പിടിയാണ് അവതരിപ്പിച്ചിരിക്കുന്നത്	
Reflections of scientific fish farming in Kerala	
കേരള മത്സ്യകൃഷിയുടെ	
ഒരവലോകനം	
കൊച്ചുകുട്ടികൾക്ക് മാത്രം ഉപയോഗിക്കാവുന്ന	
Urea super granules for improved nitrogen recovery	
നൈട്രജനെ കൂടുതലായി ഉപയോഗപ്പെടുത്തുന്ന	
പുതിയ രീതിയെ കുറിച്ച്	
തെങ്ങിനെ ബാധിക്കുന്ന രോഗങ്ങൾ	
നിയന്ത്രിക്കുക	
തെങ്ങിൻ തോപ്പിൽ ഇടവിള കൃഷിരീതി	
പടവലങ്ങ കൃഷിരീതികൾ	
കുഞ്ഞാവ്	
ശ്രദ്ധ വിളവെടുപ്പും സംസ്കരണവും.	
Early sowing kharif groundnut crop	
Hybrid pepper performs well in arecanut garden	
Three serialised lessons were given to newspapers during the period under report:	
Rice production technology (8 lessons)	
Cashew apple products (8 lessons)	
Tips for coconut farmers (5 lessons)	

എല്ലാ പത്രങ്ങൾക്കും.
The Hindu
മലയാള മനോരമ
എല്ലാ പത്രങ്ങൾക്കും.
ദീപിക
"
എല്ലാ പത്രങ്ങൾക്കും.
മലയാള മനോരമ
എല്ലാ പത്രങ്ങൾക്കും.
ദീപിക
"
The Hindu
എല്ലാ പത്രങ്ങൾക്കും.
ദീപിക
എല്ലാ പത്രങ്ങൾക്കും.
"
മാതൃഭൂമി
എക്സ്പ്രസ്സ്
എല്ലാ പത്രങ്ങൾക്കും.
Seafood Export Journal.
എല്ലാ പത്രങ്ങൾക്കും.
"
"
The Hindu
എല്ലാ പത്രങ്ങൾക്കും.
"
ദീപിക
മലയാള മനോരമ
എക്സ്പ്രസ്സ്
എല്ലാ പത്രങ്ങൾക്കും.
The Hindu
Intensive Agriculture
Veekshnam
Deepika
"

Research highlights in capsule form were published in all leading newspapers. Sixteen such items were published during the period under report.

A serialised documentary, including 19 articles, on KAU Stations was published in "Mathrubhumi".

Development News including 11 detailed development news items on KAU were issued to leading newspapers and radio.

Questions & answers columns giving answers to farmers' querries were regularly published in the "Karshikarangam" pages of two Malayalam dailies viz. "Malayala Manorama" and "Deepika".

b) Radio programmes:

Agricultural University News:

Under this Programme, an exclusive 'KAU News' broadcasted regularly on all the Fridays between 6.45-6.50 AM. As a break from the past, the 'KAU News' is now read by the scientists working in the Directorate of Extension.

Farm School on AIR

The Farm School on AIR Programme on "Coconut Management" conducted through AIR, Trichur on "Co-operative Movement in Kerala" is in progress now.

Documentary Programmes

Two documentary programmes one on the "University Poultry Farm" and the other on "Backyard Poultry Rearing" were broadcasted through AIR stations in Kerala.

c) Television Programmes

Earnest efforts were made to utilise this powerful and universal mass medium for transferring agricultural technology, during the period under report. A script on "Rice Gardening" (Mal.) was prepared and supplied to Doordarshan Kendra, Trivandrum, for its Agricultural Programme. This programme was telecasted on 17-1-85. News items and press releases are regularly fed to the Doordarshan Kendra, Trivandrum also.

d) Correspondence course

The correspondence course on "Dairying" was completed during the period under report. A contact class for the selected participants was arranged as part of the correspondence course on 18-3-1985.

The new correspondence course on "Flower Gardening" was started during this year. 530 persons have registered for this course. Ten lessons were sent to them during the period under report. Scientists working in KAU stations have been identified as the Resource Persons and an orientation class for them is also planned.

The correspondence course on "Infant feeding practices" (Malayalam) is in progress. About 550 persons have registered for this course.

e) Farm News programme

Under this quarterly programme timely tips on agricultural technology were sent to the Junior Agricultural Officers in the State.

B. EXHIBITIONS

a) Major exhibitions

The KAU participated in the All India Agricultural and Industrial Exhibition (Trichur Pooram Exhibition) during April-June, 1984. The main theme of the exhibition was "Homestead Development by Mixed Farming". Slide shows and consultancy services were arranged in the Pavilion. A sales counter was also functioning in the Pavilion through which KAU Publications, seed, seedlings etc., worth Rs. 14000/- were sold. Over 7 lakh people visited the KAU pavilion. The KAU Pavilion bagged the "Best Pavilion Special Prize".

From 12th March to 28th April, 1984, the KAU participated in the All India Exhibition at Marine Drive Grounds at Ernakulam.

b) Mini exhibitions

During the period under report, ten Mini exhibitions were conducted in the Lab to Land and Village Adoption Centres of the University. These exhibitions were held at Kozhukully, Nellikkunnu, Vilangannoor, Moorkanikkara, Tavanur, Madakkathara, Mannamangalam, Odakkali, Kizhuparambu and Pattambi.

C) GRAPHICS & COLOUR LABORATORY

During the period under report, 450 black and white exposures, 145 colour exposures, 1200 colour transparencies, 740 black and white transparencies and 225 black and white copies (blow-ups) were prepared in the colour processing laboratory. Other items of work included cover designs, Overhead transparencies, illustrations, graphs, posters, display materials etc.

D) A-V LABORATORY

The public address system was used for all the University functions including the recording of the proceedings of the General Council meetings, Academic Council meetings, Lab to Land programmes, Advisory Committee meetings etc. Slide shows, film shows etc., were arranged in the adopted villages, Lab to Land centres, students' functions and in the training courses.

E) ADULT EDUCATION PROGRAMME

Two Adult Education Centres were co-ordinated by the Communication Centre during the period under report. The first one functioning

at College of Horticulture, has 16 farm labourers and the second one functioning at the Communication Centre has 6 farm labourers as participants. Classes were handled regularly in these two centres by the staff of the Communication Centre.

F) PUBLICATIONS

i) Publication of periodicals

'KALPADHENU' is a quarterly publication in Malayalam. Its publication was made upto date and four issues of Kalpadhenu were brought out during the period under report. which include special issues on vegetables and social forestry. 4500 subscribers were enlisted and the despatch work was also streamlines.

The KAU newsletter is the house magazine of KAU which highlights the important activities of the University. This newsletter was published regularly every month.

The Nutrition newsletter, published from the Department of Home Science, College of Agriculture, Vellayani, was regularly published as a quarterly during the period under report.

The Research Journals viz. Agricultural Research Journal of Kerala, Kerala Journal of Veterinary Science and Research Abstracts were also published regularly during the period under report.

(ii) Publication of non-periodicals:

The following bulletins monographs leaflets were published during 1984-85.

Technical bulletin (Malayalam)	[illegible]
"	[illegible]
"	[illegible]
"	[illegible]
"	[illegible]
"	[illegible]
"	[illegible]
"	[illegible]
"	[illegible]
Leaflet on (Malayalam)	കുഞ്ഞിന് അമ്മിഞ്ഞപ്പാൽ അമൃതം
"	മുലപ്പാലിനുപകരം കുപ്പിപ്പാൽ നൽകരുത്
"	വീട്ടിൽ തയ്യാറാക്കാവുന്ന ശിശുകേന്ദ്രണങ്ങൾ
"	ശുചിയായ പാലുൽപ്പാദനം

Book (Malayalam) ആദ്യ
" കേരളം കൃഷി
Pamphlet on (English) KAU Today
Course material on (Malayalam) പച്ചക്കറി ഇനങ്ങളും
കൃഷിരീതികളും
Analytical manual on (English) "Fish and Fish Products"

The following publications were under various stages of processing/ printing

Printing started/script prepared

Technical bulletin (Mal) തെങ്ങിനത്തര
" പ്രത്യേകകൃഷി
" മണ്ണാരോ
Manuals on (Mal) പുരയിടങ്ങൾ
Extension teaching methods
Technical bulletin (Mal) [illegible]
(revised edition)
Bamboo
" (Eng)
Handbook of KAU (Eng)
University Dairy (Eng)
Bulletin (Eng) Nutrition Garden

A sales counter was functioning in the Communication Centre to sell the publication of KAU.

As part of Public Relations work, Press Releases were issued through the mass media.

G) FARM ADVISORY SERVICE

The FAS is functioning under the Directorate of Extension to give opportunity for the farmers to discuss the various technical problems they are confronting and to expose the scientists of the University to the field problems faced by the farmers.

The main work of the FAS is to conduct seminars in Agriculture, Animal Husbandry and Fisheries in the different districts of Kerala State in collaboration with the various Development Departments other Development agencies, input firms and service organisations. The FAS also serves as the liaison between research workers and practising farmers. The experts of the FAS also make field visits as a "Diagnostic Team" to suggest solutions to various problems faced by the farmers whenever necessary. Conducting front line demonstrations on proven techonologies is another item of work of the unit. Providing backstoppage to the Department of Agriculture is also envisaged in the programme. The activities of the FAS during 1984-85 are as follows.

Seminars

The FAS actively praticipated and took leadership in the organisation of seminars in the adopted villages and Lab-to-Land centres of the University. The experts also served as resource personnel for leading discussions and clearing the doubts of the farmers in the seminars conducted by other development agencies, input firms and voluntary organisation. Altogether the FAS involved in 48 seminars in which a total number of 5385 farmers participated.

Farm Clinic

To help the farmers in their own habitats, a programme called "Farm Clinics" was started during the year. The farmers in a locality are advised to assemble at a common place and the scientists visit the place on a fixed date. Three such clinics, one each at Moorkanikkara, Nellikunnu, and Nadathara, were organised and the experts gave technical advice and help to the farmers in the field of Agriculture, Animal Husbandry and Fisheries. These centres were regularly visited once in a week in order to have follow-up action as well as to instill confidence among the farmers in the Farm Advisory Service.

Front line Demonstrations

Rice:- A crop demonstration was taken up at Kalathode (Trichur) to highlight the qualities of the rice variety Pavizham (MO-6) in 0.3 ha. An yield of 500 kg/ha was recorded

Poultry Unit:- A model poultry unit of 1000 broiler birds, was run at Vilvattom, under self-employment scheme with complete technical aid from FAS. The farm youth Sri. Suresh involved in the programme is now earning a regular income. The unit is taken as a model project for self-employment.

Consultancy service

Advice was rendered to sixty eight farmers who personally contacted the FAS Unit. In addition to this, replies were given to 154 farmers who raised doubts and questions through letters. The fields of advice covered Agriculture, Animal Husbandry, Poultry and Fisheries.

H) KAU PRESS

The KAU Press at Mannuthy caters to all printing requirements of the University. A total of 240 printing works were completed during the period under report. These items included books, monographs, technical bulletines, folders, pamphlets, registers, Annual Report, Research Reports, Research Journals, Magazines etc. The KAU Press bagged the "All India Prize for Excellence in Printing" (under the category of magazines, bulletines, souvenirs in Indian languages) at the 22nd All India printers Conference and Exhibition 1985.

I) KRISHI VIGYAN KENDRAS (KVK)

Two ICAR funded Krishi Vigyan Kendras are functioning under KAU viz. KVK Pattambi and KVK for tribal at Ambalavayal.

Training courses with practical and vocational education background were regularly conducted by KVKs. The training programmes scheduled in KVKs are based on the principle of 'Earning by doing'.

Krishi Vigyan Kendra, Pattambi

The following training courses were conducted during the period under report.

		Duration	No. of trg.	Off/on campus	No. of trg.
1	2	3	4	5	6
a)	**Agriculture**				
1.	Scientific cultivation of Rice	1 day	59	off	1154
2.	,, of Coconut	1 day	40	off	747
3.	,, of Banana	1 day	17	off	295
4.	,, of Vegetable	1 day	5	off	82
5.	,, of Pepper	1 day	1	off	16
6.	,, of Sweet potato	1 day	1	off	15
7.	,, of Ginger	1 day	1	off	17
8.	,, of Arecanut	1 day	1	off	24
9.	,, of Gingelly	1 day	1	off	7
10.	Weedicide application on garden land	1 day	1	on	6
11.	Budding and grafting tribal youths	3 days	1	on	5
			128		2360
b)	**Animal Production**				
1.	Backyard poultry management	1 day	8	off	106
2.	Management of milch animals	1 day	14	off	201
			22		307
c)	**Fisheries**				
1.	Composit inland Pisciculture	1 day	11	off	150
2.	Economic processing of fish	1 day	19	off	190
			30		307

1	2	3	4	5	6
d)	**Home Science**				
1.	Low cost balanced meal for rural women	1 day	3	off	40
2.	Low cost nutritions wearing food	1 day	1	off	26
3.	Infant feeding	1 day	2	off	50
4.	Preservation of banana	1 day	1	off	10
			7		126
e)	**Integrated training for tribal youth** Agriculture, Animal Husbandry, Fisheries etc.	30 days	2	on	40
	Grand Total		189		3191

Krishi Vigyan Kendra for Tribals at Ambalavayal

The Krishi Vigyan Kendra at Ambalavayal started functioning with financial assistance of ICAR from June, 1984. Before that, it was functioning with Kerala Agricultural University funds. The following training programmes for tribals were conducted by the Kendra during the year.

Sl. No.	Name of training programme	Duration	No. of courses	No. of trainees
1	2	3	4	5
1.	Training on identification of pests and diseases of ginger and their control	1 day	3	30
2.	Ginger cultivation	1 day	2	25
3.	Identification of pests and diseases of rice and their control	2 days	3	87
4.	Calf rearing	1 day	3	45
5.	Training on principles and method of plant protection	2 days	2	30
6.	Refresher training course for the tribals on plant protection.	1 day	3	85
7.	Intercropping pulses with tapioca	1 day	3	45
8.	Training on management of pepper	1 day	2	30
9.	Refresher training on coffee cultivation	1 day	2	30
10.	Training on pests and diseases of pepper and their control	1 day	3	45
11.	Training on application of lime and fertilisers in the intercropped areas	1 day	3	45
12.	Training on integrated methods of plant protection	1 day	2	30
13.	Training on plant protection experiments, use and maintenance	1 day	3	45
				241

1	2	3	4	5
14.	Clean milk production	1 day	3	44
15.	Training on preparation and use of plant protection chemicals	1 day	3	44
16.	Training on soil testing of higher crop production	1 day	2	29
17.	Rice cultivation in Wynad	1 day	2	29
18.	Training on balanced diet	1 day	2	30
19	Training on soil and water conservation	1 day	2	30
20	Training on public health and environmental sanitation	1 day	3	45
21	Training on cultivation of summer vegetables	1 day	2	30
22.	Training on plant protection on summer vegetables	1 day	2	30
23	Training on multiple cropping in paddy fields	1 day	2	30
24.	Training on management of goats	1 day	2	45
25.	Kitchen gardening	1 day	2	30
26.	Training on propagation techniques	1 day	4	57
27.	Training on material nutrition and nutritional needs of children	1 day	2	30
28.	Training on poultry management	1 day	1	12
29	Training on preservation of fruits and vegetables	1 day	2	20
30.	Training on low cost diets	1 day	2	30
31.	Training on protein coloric malnutrition	1 day	3	45
32.	Training on contageous disease and deficiency diseases	1 day	3	45
33.	Training on health care and immunisation	1 day	2	30
34.	Training on labour saving devices hay box and janatha fudge	1 day	3	45
35.	Training on major causes or morbidity and mortality.	1 day	2	29
36.	Training on first aid	1 day	3	44
37.	Training on seed treatment of ginger	1 day	1	15
38.	Training on plant protection on paddy nursery	1 day	1	15
	Total	91		1423

TRIBAL AREA RESEARCH CENTRE, AMBOORI

The objectives of this ICAR funded programmes are:

i) to conduct researches into the problems faced by the tribals of the area.

ii) to simultaneously device operational programmes of development of agricultural production.

iii) to develop patterns of land use so that the ecological balance of their habitation of surrounding forest is not disturbed and

iv) to support the whole activity through continuous and progressive training.

The following were the activities undertaken by the centre during 1984-85

Education

A number of training programmes were organised to impart necessary skills and knowhow to Kanikkar tribals, as agriculture, animal husbandry, home science, health and small scale industries.

Research and Development activities

i) Agriculture

Suitability studies of different crops like maize, jowar, sorghum vegetables, tubers etc. were undertaken. Agronomic trials on soil conservation in the slopes by planting subabool along with contours have been taken up. A promising variety of sweet potato called Kanhangad local was distributed to the tribal families with the objective of popularising this variety. Planting of cashew seedlings was also undertaken during this period.

Trials on intercropping of tapioca with sweet potato and cowpea were also laid out. A training programme was also imparted to eighteen farmers regarding intercropping of tapioca.

Due to the receding of water in the reservoir, a lot of area in the fringes of the lake was exposed suitable for rice cultivation during December-January. Seeds of short duration varieties viz. Jyothi and Kochuvithu were distributed to the beneficiaries. The crop was harvested during the last week of April and an yield of 3.8 t/ha was obtained from both the varieties.

With the objective to introduce minor crops in this area a trial on colocassia was undertaken during this period. The performance of the crop was highly satisfactory.

A trial on rainfed banana varieties viz. Nendran, Redbanana, Poovan, and Palayamkodan was conducted in three locations with the objective to popularise these varieties and these management practices. One thousand suckers of Nendran variety were distributed among the tribals. The performance of this crop was found to be satisfactory.

Nutrition gardens were raised in the tribal villages with the assistance of NSS volunteers of the Ayurveda College, Trivandrum. The tribal man and woman participated in this programme. Vegetable seeds were distributed amount the beneficiaries.

With the view of establishing a unit of rubber plantation in each homestead, a massive programme to supply quality planting material was started during this period. A rubber nursery was established near the field office at Karikuzhy. Budded stumps of improved clones viz RRII-105 were procured and planted in polythene bags. The first lot of 4000 plants are getting ready for distribution in the ensuing planting season. A survey was also conducted on the whole settlement to select areas suitable for rubber cultivation.

Three thousand arecanut seeds of Mangala variety were procured from the field station of Central Plantation Crops Research Institute at Vittal to raise the seedlings. The caused seedlings will be supplied to the beneficiaries.

Planting materials of different fruit plant such as Jack fruits (300 Nos.) Mango grant(200 Nos.)papaya(100 Nos.)and lemon(100 Nos.) were distributed to beneficiaries.

The soil conservation work in the slopes of the settlements was completed. In order to strengthen the bunds a programme was initiated to grow pineapple, subabool and pepper along the bunds, which also contributes additional income to the beneficiaries.

ii) Animal husbandry

A veterinary clinic was opened at Karikuzhy.

Cross-bred ducklings (Khaki campbel x Desi) were supplied to 10 families to study their adaptability. Training for the management of ducks were also given to the beneficiaries. Poultry, goats and heifers were also supplied to the tribals.

A survey was conducted to study the feasibility of rearing pigs in tribal areas.

A training programme was conducted in rearing and management of rabbits. Fifteen tribal people attended the programme.

Veterinary clinics were regularly conducted in the settlements.

iii) Health

The methods of treatment adopted by tribal people for treating common ailments were analysed as a follow up activity and it was found that the indigenous medicines such as Vethumaran Gulika Amsitharishtam were effective against Pyrexia, Kanakasaram, Suryaprabha Gulika and Pathari Choornam were effective against Asthmatic complaints, Mustharishtam and Pippalyasavam against Diarrhoe Dyspepsia, Kottanchukkadi tailam and Maharasnadi decoction for Rheumatic complaints, Murivenna against physical injuries and Panchathikthakam decoction, Vilwadi gulika and Nalpamaradi Keram (Ext.) were found effective against skin diseases.

Health clinics at field office and clinical camps in different settlements were regularly conducted.

A study on the ethnomedicines practised by Kanikkars was made. The medicinal plants identified were grown near the field office to establish a 'Herbal Museum'.

iv) Home Science

The home science programmes conducted during this period include open school education on nutrition, distribution of seeds for raising nutrition garden, imparting training in tailoring to tribal girls etc.

Questionnaires were also prepared to analyse the following aspects of the tribal people; income generating activities, child care practices, infant feeding practices, improving living conditions-consumption and clothing pattern. Training programme for the Balawadi children were also conducted. Tribal people were advised to develop saving habit.

v) Small scale Industries

Beehives were distributed among the tribal people. Technical assistance and inputs were supplied for clean honey production.

The leaf cup making machine is being used to test the locally available leaves to find out the best suited leaves for plate making.

An electrically operated food processor was purchased for making chips of tapioca, banana and sweet potato.

A training programme was conducted in collection of Minor Forest Produce. Tribal men and women attended this training programme. The aspects of the training programme included collection, presentation and processing and marketing of non-edible oilseeds which are available in the homesteads and forests.

ALL INDIA CO-ORDINATED PROJECT ON SCHEDULED CASTE AREA RESEARCH CENTRE, NILAMBUR

The KAU Project centre is implementing the ICAR Funded All India Co-ordinated Project on Scheduled Caste Area Research among the selected 277 Harijan families and 23 Girijan families of the five Panchayats in the Nilambur Community Development Block.

A resume of activities, discipline wise, during the period under report is presented below:

The scheme on developing suitable modules for year-round production of vegetables involved training programme on kitchen gardening for selected 10 Harijan women from each Growth Centre and they in turn acted to popularise vegetable cultivation in respective youth centres. The training was imparted by the Krishi Vigyan Kendra, Pattambi of Kerala Agricultural University. Seeds and fertilisers were distributed and data were recorded. The Scheme is quite encouraging to the beneficiaries, and incomes to a tune of Rs 300/- to 400/- have been additionally gained by a number of beneficiaries.

Under the scheme for the Tribals to identify varieties of Sesamum suitable to the area and to standardise cultivation techniques, 5 trial cum demonstrations were laid out. The varieties of seeds given were "Kayamkulam-1" and "Thilothama" procured from Kayamkulam Rice Research Station. These varieties were found to be suitable to the Nilambur locality, out yielding the local varieties. The scheme is being continued for better standardisation of management techniques.

Ten selected families were trained in irrigated banana cultivation and necessary suckers and fertilisers were given as critical inputs for 50 cents trial plots. The usual planting time followed earlier was April-May (Rainfed). The change of planting time was emphasized keeping in view of 'ONAM' demands of next year. Pulse seeds and vegetables are being tried in these plots.

Sri. P. Cheolan, a Project beneficiary gained Rs. 1400/- during the season as additional income gained through vegetable cultivation as an intercrop in Banana. Harvesting of banana will be done in August-September, 1985.

Fifteen Harijan youths selected were given training in skill orientation in Agricultural Practices. Two batches of 5 youths each were sent to the Institute of Agrl. Technology and Krishi Vigyan Kendra, Pattambi for attending the 3 day training on handlings of PP equipment, Nursery techniques of vegetative propagation, respectively. The trainees were guaranteed with IRDP benefits for starting self-employment through the Community Development Block, Nilambur.

As a pre-requisite, seed samples of locally cultivated varieties viz., 'Thottacheera', 'Padannavella', 'Kochuvithu', 'Kalluruni','Kochithonnuran', Chamamoodan and Veluthakutty were sent to Rice Research Station, Pattambi for mini trials. The new varieties like PTB 28, PTB 29, PTB 30, Cul-1907 and Suvarna Modan will be tried in 50 cents plots at Jawahar Colony. 5 farmers attended the one day training on 'Modan' cultivation imparted by the Krishi Vigyan Kendra. The required seeds have been procured from KVK Pattambi and the scheme will be implemented in the ensuing season at Jawahar Colony at Appankappu Colony for the benefit of the selected families.

Reports from RARS, Pattambi showed that seeds sent for modan land were promising and trials can be conducted in more extensive way with the following varieties.

Kochu thonnuran, Kalluruni, Channa Moodan, Veluthakutty.

The Schemes on trials with high yielding varieties have been initiated in Jawahar Colony and Appankappu.

In connection with the Scheme on Introduction of Tuber crops other than Tapioca to meet dietary as well as seed material needs, 25 families have been selected and preliminary training has been imparted at the Centre.

Under the Scheme on Tapioca, stem cuttings of improved Tapioca varieties have been supplied to the selected 10 families, 2 each from the five Growth Centres, to be planted in the ensuing season.

ANIMAL HUSBANDRY

The Scheme on adaptability of Cross-bred Milch Goats is being continued in Jawahar Colony. 4 Alpine-Sannen Malabari goats with kids were given to selected four Harijan families.

Cross-bred Milch goats' adaptability in the area has been found not good and supplying of local Malabari type has been achieved.

The Project Centre in collaboration with Regional Artificial Insemination Centre conducted 4 infertility camps at Jawahar colony, Uppada, Chungathara and Edakkara. The camps were open to all communities. Nearly 150 animals were examined by the Veterinary experts from KAU. More camps are planned.

A scheme on the Introduction of Fodder Trees in the Project area is supported by the Social Forestry Wing of Forest Department and Dairy Extension Unit. Earlier, the Centre had supported the Fodder Grass Development Scheme of Kerala Livestock and Dairy Development Board.

Under training schemes on goat management, working cattle management and cattle shed management, lecture-training classes were conducted at Jawahar colony, Mummulli, Vellakketta and Boodan Colony during January 1985. Experts from KVK Pattambi extended the necessary expertise.

During the last week of February a Veterinary team consisting of Experts from KVK Pattambi and College of Veterinary and Animal Sciences visited Boodan colony and took preventive measures against F & M and B. Q. for 48 animals in connection with the Krsan Mela and Cattle Show on 26th and 27th of February 1985.

Home Science/Health and Nutrition

Three lecture classes on Health and Nutrition were conducted at the Chungathara and Vellakketta Growth Centres, collaborating with the PH Centre, Chungathara and the State Department of Health. At the Project Centre two lectures on Nutrition and Child care were held during July 1984, for the project beneficiaries. In order to combat the dietary deficiency prevailing in the area, the scheme on developing suitable modules for year-round production of vegetables has been launched.

A Medical Camp was conducted on 20th August 1984 at Vellakketta for the benefit of Harijans and Girijans in association with

Department of Health benefitting nearly 150 persons. Another Medical camp, in collaboration with Department of Forest, Department of Health, the Kalkulam Girijan Society and the Jaycees International, Nilambur Chapter, was conducted at the Tribal Colonies of Nedumgayam, Myladipotti and Mundakkadavu on 19th August, 1984 was beneficial to 350 tribal people of the Karulai Forest Range. Eight Doctors participated and medicines worth around Rs. 8,000/- were given to the needy.

Lecture classes on Home Management and Public Health were conducted on 23rd January and 23rd March, utilizing personnel from KVK, Pattambi, Extension Service and Local Carmaleetha Mission, at Mummulli, Vellakketta, Thampurattikallu and Boodan Colony.

A Medical camp was conducted at Boodan Colony on 26th February, in collaboration with the District Women's Council and Department of Health. 800 persons were examined, including 360 tribals. A Health Seminar also was convened on the day.

The Schemes on oral Rehydration Therapy and immunisation programme has been initiated at Boodan Colony during the third week of February, 1985. The schemes have been launched with assistance from Department of Health and Carmaleetha Mission, Nilambur.

General Schemes

The Vellakketta and Mamankara Harijan clusters of the project beneficiaries have been included in the Nutrition Programmes of State Health Department during the year.

The one day one-meal programme of the Community Development Block has been extended to the Tribal colonies of Appankappu and Nedungayam.

The Development Block has sanctioned 6 Harijan Community wells in the Project Growth Centres.

Homestead vocations

The schemes on introduction of improved Potters' Wheel and Training Programme in modern trends in Pottery which began in October, 1984 were intended to increase production quantitatively and qualitatively and to generate more income and employment to the selected 8 Adi Andra-traditionally potters-families of Boodan Colony. The scheme has enhanced average monthly income of the family to Rs. 500/- from the earlier Rs. 320/- and it has as well generated an additional 150 man days of employment.

The scheme on clay modelling as homestead vocation to Harijan women, and the training programme imparting basic skills to 8 trainees at Thampurattikkallu were implemended. The scope on marketing of clay models is being assessed.

The tailoring and embroidery classes at Vellakketta which began on 25th October 1984 is in continuation of the successful scheme at Jawahar Colony, where this training class had generated 141 men days of employment for Harijan women and an additional income of Rs. 1410/-. Two trainees were able to start their own enterprises. This popular skill development programme now imparts training to 20 students.

The following agencies and Institutions were contacted in the implementation of the above schemes :

Indian Lac Research Institute, ICAR, Nungum, Ranchi.
Central Village Pottery Institute, Kanpur.
Department of Khadi and Village Industries, Government of Kerala
Ceramic Pottery Centre, Calicut.
District Industries Centre, Malappuram.

Under the training programme in handicrafts with bamboo and reeds, 8 selected Harijans were given basic training at Vellakketta, during January—March 1985.

The scheme on Honey Bee collection imparted necessary exp er tise to 16 trainees selected from Thampurattikkallu, Appankappu, Nedungayam and Mudakkadavu. A 3 day training programme was conducted availing the services of local Apiarist and Kozhikode Sarvodaya Sangh, on 21, 22 and 23rd of March, 1985.

Another scheme intends to provide necessary bamboo poles to popularise the bee-hives management with bamboo poles and to standardise management techniques. Kozhikode Sarvodaya Sangham's Apiarist conducted 3 lecture classes for the project beneficiaries at Appankappu and Thampurattikkallu. 16 trainees from Nedungayam and Mudakkadavu Tribal clusters also participated in the programme.

Under the scheme on commercial painting for talented Harijan youth, 5 trainees were given basic training on commercial painting with lecture classes.

Adult Education

Under the aegis of the KAU Project Centre, 14 Harijan-Girijan samithies have been organised and Adult Education centres are functioning under them quite successfully. During the year under report the Centre extended financial assistance to the following samithies under the Scheme on Organising Adult Education Centres and providing the paraphernalia.

Pulari Kala Samithi, Vellakketta
Venus Arts & Sports Club, Thampurattikkallu
Grama Swaraj Samithi, Boodan Colony
Santhi Samajam, Ambalakkunnu
Chaithanya Girija Mahila Samajam, Palakkayam

The centre will be sponsoring the Functional literacy campaign of Nilambur Development Block to provide basic literacy to the beneficiaries, in their project, with 40 per cent target component for scheduled castes and 30 per cent for scheduled tribes. This project will generate employment to 25 Harijans in the coming year.

Extension Educational Activities

In collaboration with Field Publicity Department and Dairy Development extension Unit, 5 educational film shows were conducted at Mamankara, Uppada, Mummulli, Karappuram and Karunechi during August, 1984. The Graphic and Exhibition Unit of the Directorate of Extension, Kerala Agricultural University conducted 4 film shows at Vellakkotta, Boodan colony, Nilambur and Chokkadu.

The All India Radio, Farm Unit, Calicut broadcasted two programmes on AICP on SCAR and Graphic Exhibition Unit of Kerala Agricultural University made 500 colour slides on various aspects of Harijan-Girijan life and on AICP on SCAR.

The following training programmes were conducted during the year:

One day training in scientific cultivation of cashew at Appankappu on 4th April (30 trainees)

One day training in Bee-keeping at Appankappu on 2nd May (15 trainees)

One day training in Coconut cultivation at Vellakketta on 7th August (20 trainees)

One day training in Sesamum cultivation at Jawahar colony on 17th September (10 trainees)

Three days training in Kitchen gardening at District Agricultural Farm, Muttikkadavu on 17th, 18th and 19th September (10 trainees)

On week lecture-cum-training programme in Goat Management at Jawahar colony (10 trainees)

One day training in Cattle Management at Vellaketta and Mummulli on 25th and 26th January (10 trainees)

Three-day training programme in Bee-keeping at Thampurattikkallu and Appankappu on 21st, 22nd and 23rd of March 1985 (20 trainnes)

Under the programme on Organisation of Mahila and Youth Organisation for the successful implementation of the Project as well as to animate the Harijans, the following organisations have been formed and registered.

Pulari Kala Samithi, Vellakketta
Santh Samajam, Ambalakkunnu
Swapna Arts Club, Mummulli
Grama Swaraj Samithi, Boodan Colony
Venus Arts & Sports Club, Thampurattikkallu
Jawahar Arts & Sports Club, Jawahar Colony
Harijan Mahila Samajam, Vellakketta
Dhanya Mahila Samajam, Mummulli
Chaithanya Girija Mahila Samajam, Palakkayam
Priyadarsini Harijan Mahila Samajam, Nedumpuzhayi Kalakunnu
Indira Harijan Mahila Samajam, Kaipini
Nava Rashmi Girijan Mahila Samajam, Valanthode
Indira Mahila Samajam, Jawahar Harijan Colony
Avani Mahila Samajam, Kuttikunnu

Youth Organisations are being organised at Anakkallu, Karappuram, Karunechi and Mahila Samajams at Appankappu, Panampatta and Nedungayam

The Centre has also initiated a project to imbibe thrift habbit, among Harijans and Girijans and necessary steps have been taken for starting S. B. Account with Banks. The following Samithies are being covered under this campaign during this year.

Navarasmi Girijan Mahila Samajam, Valanthodu
Priyadarsini Harijan Mahila Samajam, Nedumpuzhai Kalakunnu
Avani Mahila Samajam, Kuttikunnu
Chaithanya Girija Samajam, Palakkayam

The project centre sponsored the 10day National Service Scheme camp for the students of Providence Women's College, Calicut during the latter half of the month of September in unison with the Carmaleetha Mission. 80 students participated in the camp. The internship Veterinarians from the College of Veterinary and Animal Sciences, Kerala Agricultural University were taken to the Harijan and Girijan clusters under AICP on SCAR for field experience on 15th and 16th September.

The students of the College of Veterinary & Animal Sciences visited the Chokkadu and Mundakkadavu Tribal colonies on 12th February, 1985. The Centre offered assistance to the students and staff from the Institute of Rural Management, Anand (IRMA) in their Field Training Segment at Nilambur Tribal areas during 16th to 18th of January 1985.

Annual Kisan Mela

The Annual Kisan Mela of the Centre was celebrated at Boodan Colony on 26th and 27th of February, in full collaboration with the Dept. of Agriculture and allied Departments.

A cattle show was conducted and all the animals participating in the camp were given concentrated feeds. A seminar on Animal Management was also organised. Preventive vaccination programme against Foot Mouth, Haemorrahgic Septicaemia and Black Quarters was also undertaken by the Experts from the KVK Pattambi and the College of Veterinary and Animal Sciences. The Department of Extension, College of Veterinary & Animal Sciences, organised a Film show.

National demonstration scheme, Sadanandapuram

The following were the activities undertaken by the NDS to demonstrate the new technologies to the farming communities:

Demonstrations

During 1984-85, twenty demonstrations were conducted in farmers' holds at various locations in Quilon district. The details are as follows:-

1. Entire farming demonstrations	5 Nos
2. Crop Demonstrations (14)	
i) Paddy	— 9 Nos
ii) Tapioca	5 Nos
3. Problem soil demonstration	— 1 No
Total	20 Nos

The highlights of these demonstrations were:

1. Two varieties of paddy viz. Lakshmi and Culture 25100 which are proved to be high yielding are being popularised in the tract.

2. Improved varieties of Tapioca viz., Sreesahya and Sreevisakh are popularised.

3. Liming is demonstrated to the farmers to convince them about its importance.

Field days

A total of 23 field days were organised in which 396 farmers participated.

Kisan Mela and Agricultural Seminar

A one-day kisan mela and Agrl. Seminar were organised at Sadanandapuram on 20-3-1985. 150 farmers participated in the programme.

Lab to Land Programme

The Lab to Land programme financed by the ICAR is being implemented by KAU at 32 transfer of Technology Centres.

During the third phase, 1100 farm families were selected as beneficiaries. The scheme has been extended to Attappady tribal area also from August 1984. The beneficiaries of the programme included marginal farmers, scheduled caste and scheduled tribal people, landless agricultural labourers etc.

Bench mark surveys and farm production plans of these farm families were completed. Based on the farm production plan inputs were supplied to the beneficiaries so as to improve their income level and standard of living. As educational follow-up, seminars, farm youth trainings and Kisan Melas were conducted in all the transfer of technology centres. During the period under report, "Interdisciplinary teams" have been constituted on a regional basis so as to provide technical guidance to the working of the programme and to continuously monitor the programme.

Village adoption programme

During the period under report two more villages viz., Nellikkunnu and Kalathode were additionally adopted by KAU as its demonstration centres. The total number of villages adopted by KAU during this year was 25. Specific guidelines for undertaking farm trials, frontline demonstrations social forestry and adult education programmes and for testing improved package or practices recommended by KAU were sent to all the 25 adopted villages.

Under the village adoption programme implemented by RARS, Pilicode 18 crop demonstrations were laid out. Two one-day Agril. seminars were organised by this unit on 19th and 26th March, 1985 in which 166 farmers participated. A kisan mela was also organised at this centre on 13.2.85, involving 309 farmers.

In the Thiruvalla Village Adoption Centre, 4 demonstrations on various aspects of sugarcane cultivation were laid out. In the IAT, Tavanur centre, a large-scale livestock show with the participation 1200 animals of all kinds of domestic animals was organised on 10.3.85. Along with this a mini exhibition was also conducted which was visited by over 1000 villages. A sterility camp and a parasitic examination camp were also held in this centre.

Under the auspices of the Odakkali Village Adoption Centre, a nutrition garden was raised at the Government High School, Odakkali by the Science club of that School. Technical guidance was provided by the Scientists of the Aromatic and Medicinal Plants Research Station, Odakkali. Inputs like vegetable seeds, implements like spade, rose can, *vakkathy*, spade handle etc were supplied for this purpose. One knapsack sprayer was given as the community input to the adopted villages.

In the Vyttila Village Adoption Centre, 53 farmers were persuaded to raise nutrition gardens. In the adopted villages of the College of Agriculture, Vellayani 20 frontline demonstrations on Gingelly (variety Thilothama) were laid out. One Seminar on Gingelly cultivation was also conducted at Muttackad and Kalliyoor.

A front line demonstration on Pavizhom (MO-6) paddy variety was laid out at Kalathode centre. The yield obtained was 5000 kg/ha and as a result this variety is very popular among the farmers in this area. Community inputs like sprayers were given in Kalathode, Mannamangalam, Pananchery and Kozhukully centres. Group discussions, seminars, exhibitions, farm clinics trainings etc. were organised in these adopted villages. The students of KAU participated in the Village Adoption programme actively to gain adequate field experience.

T & V Monthly workshops

The scientists of KAU regularly attended the T & V monthly workshops of all the districts in the state as resource personnel. They also participated in the preworkshop co-ordination meetings and the joint field visits. In all, twelve preworkshop co-ordination meetings and twelve monthly workshops were conducted in each of the districts of Kerala State during the period under report. These workshops served as the forum for interaction between the University Scientists and the Extension personnel of the State Department of Agriculture.

National Service scheme

During the period under report, 8 NSS units were functioning, in KAU with 1000 student-volunteers.

XIV. Extension Lecture Series

During the period under report the following extension lectures were organised:

Topic	*Name of lecturer*	*Date, Venue*
Genetic Engineering	Dr CK Krishnan Nair, Babha Atomic Res. Centre, Trombay	9.4.1984 College of Vety. & Animal Sciences, Mannuthy.
Recent theories on Asthma	Dr C. S. Venugopal, Asst. Professor, Lousiana University of U. S. A.	4.7.84 College of Vety. & Animal Sci., Mannuthy.
Forest tree breeding	Dr S. Kedarnath, Director, KFRI, Peechi.	24.7.84 College of Vety. & Animal Sci., Mannuthy.
Tissue culture, Coconut tissue culture	Dr C. Rajan, Scientist. CPCRI, Kasargod	15.11.84, 16.11.84 College of Hort., Vellanikkara.
Information Explosion and Problem of literature search	Dr K. A. Issac. Library Adviser, Kerala University, Trivandrum	30.1.1985 Directorate of Extension, Mannuthy.
Human Resources Management in Agriculture	Dr P. R. Poduval, School of Management, Cochin.	16.1.1985, Directorate of Extension, Mannuthy.
Agriculture Development in China	Dr K. K. Subramaniam. Centre for Development Studies, Trivandrum.	8.3.1985. Directorate of Extension, Mannuthy

SEMINARS

Seminar on KAU 2000 AD

A Seminar on "KAU 2000 AD" was conducted at the Headquarters of the University from November 22nd to 24th 1984. Over 300 delegates participated in the Seminar. Over 70 technical papers were presented in the seminar.

Sri P. Rajendran, Asst. Professor and Sri N. Vijayakumar, Jr. Asst. Professor, SCARG, Nilambur attended the "Annual workshop of SCARC" at Coimbatore from 29.1.1985 to 22.2.1985.

Smt P. S. Geethakutty, Jr. Asst. Professor, Communication Centre attended the workshop on "Farm Feature Writing in Dailies" at Trivandrum for four days in February, 1985.

New Extension Programmes

Krishi Darshan Programme

This is a new programme organised with the purpose of establishing good rapport with the farming public and to acquaint them with the latest developments in the Research Stations under the KAU. All the Research Stations have taken up this programme and the programme is being continued.

Horticultural Therapeutic Aid

This is a novel extension programme implemented at the Cheshire Home, Trivandrum and at the Pope Paul Mercy Home, Perungandoor, Trichur, by the KAU. This programme is organised with the objective of improving the mental health of the physically and mentally retarded people through horticulture and to improve the diet of the above people through the production of vegetables and fruits.

Under this programme, free advice was given and inputs such as seeds, seedlings etc. were supplied to establish nutrition and ornamental gardens. The programme is progressing adequately.

Extension studies to evaluate the various extension education programmes have been conducted during the period under report. The reports are being analysed.

KVK at Manjeshwar

The KAU has sanctioned the establishment of a KVK for the linguistic minorities of Kasaragod area at Manjeshwar. This project was run with financinl assistance from KAU. A Jr. Asst. Professor was posted from 22.10.1984 to do the preparatory work for establishing this Kendra. Efforts are underway to acquire the farmlands for the kendra and to conduct the training programmes.

□

CHAPTER IV

Engineering Wing

The Engineering Wing of the Kerala Agricultural University consists of Directorate of Physical Plant, Vellanikkara with two divisions, one at Pilicode and the other at Panangad. There are five sub-divisions, three at Vellanikkara, one at Mannuthy and one at Vellayani. The control of the construction and maintenance of the buildings, roads, procurement of equipments, vehicles, machinery etc. are the responsibilities of the Director of Physical Plant. Sri K. R. Krishna Pillai continued as the Director of Physical Plant during the year. The list of staff of the wing is furnished in Appendix III.

Budget provision for the year is Rs. 350 lakhs under works (Plan) and Rs. 25 lakhs under maintenance and repairs. The expenditure upto 31-3-1985 is Rs. 310 lakhs.

The stages of major works are noted below:

At Vellanikkara formation of 'C' Road along Radio Isotope Laboratory to Ladies Hostel and formation of 'C' Road to type V and IV quarters are completed. Black topping of these roads has been tendered. Formation of balance portion of 'B' road has been arranged. Construction of additional ten Type II quarters have been completed and allotted for occupation Works of Training & Research Building Bachelors Hostel, Trainees Hostel, School building and Net House were completed. Ladies Hostel, Glass house, providing street lights along the 'A' Road and 'B' Road etc. are nearing completion. Works of Canteen building, office for Pineapple Research Station, Type I Quarters Insectory building are in good progress. The works for 'Flat' type quarters at Vellanikkara and G. L. tank for improving water supply arrangements in Main campus are in progress. Ten numbers of Type II quarters and 'paddies' for estate workers have also been arranged, but could not be started due to the delay in cutting and removing of rubber trees and clearing the site. The construction of a building for accommodating the co-operative store has been completed. Works for providing street light along road leading to Ladies Hostel and Radio Isotope Lab. and to the Road leading to Type IV, V & VI quarters and construction of two blocks of Teachers Hostel in Main Campus have been arranged.

At Mannuthy, the balance works of Dairy Technology Building have been arranged and nearing completion. Erection of machinery for Dairy Technology Unit also is nearing completion. The works of Rearing House, Breeder House, building for hundred experimental animals and additional Ladies Hostel are completed. The works of additional Lecture Hall, Construction of an Additional Floor to P. C. Hostel and Type V quarters under NARP are in progress. Works for Metabolism centre, Small Animal Breeding Station and a Lab. under NARP are also in progress. Improvements to Foot Ball Court and providing under drains and improvements to Hockey Court are completed. Construction of two flats for 36 families is also in progress. Deepening the tank in AICRP Poultry has been arranged and fencing the balance portion of southern side of Mannuthy campus are in progress. Estimate and other details of U. G. Hostel for men are prepared and is under scrutiny. For improving water supply arrangements, a Ground Level tank with 5 lakh litres has been completed. Laying of pipe and construction of pump house, erection of Pump Sets has been arranged and further arrangements, made with Water and Waste Water Authority for giving drinking water from Peechi.

Regarding the works of Fisheries College, Panangad, construction of three blocks of semi-permanent shed have been completed. Construction of 4th block, Dormitory building and Dining block for Dormitory building have also been completed, The works of additional fish ponds and improvements to acquired buildings have been arranged. Construction of Type V and IV quarters at Panangad is nearing completion. The lab. and seed store at Vyttila under NARP are completed. Construction of a Type V quarters at Vyttila has also been started. Watchman's quarters at Puduveypu have been arranged and is in progress. Type V quarters at Puduveypu is completed. The master plan for Fisheries College has been prepared. The plan and estimates for two Academic Blocks and Type II quarters have been prepared and works will be arranged soon.

At Vellayani construction of Deep Litter Poultry has been completed. The works for improvement to protected water supply to Vellayani campus have been arranged and is nearing completion. Construction of a Lab. and Library building and Indoor stadium has been arranged and are in progress. Black topping of the main road in Vellayani campus is also in progress.

Under NARP, remodelling of Agronomy Lab., remodelling of statistics Lab. and remodelling of Agrl. Chemistry Lab. are completed. Construction of Net house and Green house under NARP and the works for improvements and remodelling other laboratories in Agrl. College have been tendered and are nearing completion. At Balaramapuram, forming approach road to office has been completed.

Under NARP, Type V, IV and II quarters and farm structures under NARP scheme at Kumarakom and Type IV and Type V quarters at Moncompu have been completed and Type II quarters at Moncompu is nearing completion. Works of Lab. building at Kayamkulam, Moncompu and Kumarakom under NARP are in progress. The trainees Hostel at Kumarakom under this scheme is nearing completion.

Under NARP at Pilicode, construction of Type IV, V and II quarters and Trainees Hostel have been completed. Works for the administrative building are in progress. Type III quarters for four families and Type I quarters for 4 families have been arranged. Fencing and compound wall and construction of farm structures are in progress.

At Panniyur, construction of Demonstrators quarters and Works for providing irrigation facilities have been completed. Construction of Type II quarters and Type IV quarters are in progress.

At Thiruvazhamkunnu, construction of Type IV quarters is completed. Construction of cowbarns for 100 cows and Milk Chilling Plant are nearing completion. The lab. building and formation of the farm road, construction of silo at Thiruvazhamkunnu are in progress. The works of an A. I. centre in this station also have been arranged.

At Pattambi, construction of Type V, IV and II quarters under NARP has been completed. The works of Lab., Net House, Green House Meteorological laboratory and other farm structures under NARP are in progress. The construction of office cum hostel building under KVK have been completed. Quarters and lab. under KVK also are in progress. A seed testing lab., seed store and threshing yard under breeder seed project also have been arranged at Pattambi and are in progress.

At Ambalavayal, the works for various building under KVK have been arranged.

At Thavanur, construction of Type V and IV quarters are completed. Construction of Type II quarters, labourers waiting shed, seed store and fencing and compound wall have been started.

Fencing and compound wall for the farm at Thumburmuzhi has been arranged and improvement to water supply arrangements completed. Extension of Laboratory building at Chalakudy under NARP has been arranged and the work is in progress. The construction of Type V quarters and construction of well at Odakkali has been arranged and are in progress.

At Pampadumpara, the works of construction of Type II quarters and Type IB quarters and labourers waiting shed are in progress.

Maintenance works of various buildings and roads and other structures have been completed or are under different stages of progress.

□

CHAPTER V

Estate

An area of 379.5615 ha was acquired by the Government of Kerala for the establishment of Kerala Agricultural University and the Estate was handed over to the University on 1-5-1973. An area of 11.8753 ha have been acquired additionally during 1977 and 1981 making the total area to 391.4368 ha.

The Schemes under the Cashew, Pineapple, Pepper, Floriculture and Instructional Farm for Horticulture College have already been started functioning in the Campus. A total of 149.3 ha have been earmarked for the above schemes and farm. An area of 12 ha have been alloted to the National Bureau of Plant Genetic Resources of the Indian Council of Agricultural Research and an area of 14 ha have been alloted for Kerala Agricultural Development Project (KADP). 60 ha of land have been earmarked for the Botanical Garden. An area of about 20 ha have been utilised for buildings and roads. About 135 ha are covered with tapping trees which also include the area earmarked for Botanical garden.

An area of 1.5056 ha of land acquired during December, 1979 alloted to the College of Horticulture.

Replanting Rubber

An area of 7.98 ha have been replanted in Priyadarsini Sub-division in 1978 and 1979 with the following varieties.

		No. of plants
1	RRIM 628	494
2	RRIM 623	305
3	RRIM 600	862
4	RRII 105	1149
	Total	2810

Timely cultural and manurial operations are being carried out as per the technical advice. The subsidy from the Rubber Board is being availed of.

Research project on Growth and Yield of Rubber under different density of Planting

A research project on Growth and Yield of Rubber under different density of planting is being undertaken in Suhasini Block of Panchavadi Division, in the Estate covering an area of 6 ha in collaboration with the

Rubber Research Institute of India. There are 3300 plants in the project area. Timely oparations are being carried out on the advice of the Scientists of the Rubber Research Institute of India.

Bamboo Cultivation scheme

Two research projects i. e (i) scheme for the establishment Bamboo Plantations (Germplasm collection in Bamboo) and (ii) scheme for Sylvia-Agronomic Studies on raising energy fuel yielding tree plantation (Arbaratum of economic tree plants) are being implemented in the Estate. The plants are coming up well.

Replanting Operation (Indu Block)

With a view to replant suitable areas in the Estate a polybag nursery of 6000 plants was raised in Indu Block. The green budded stumps were purchased from the Central Rubber Nursery, Karikattur of Rubber Board. The casualty of the green budded stumps was found to be heavy. The Rubber Production Commissioner and the Deputy Development Officer of the Rubber Board inspected the nursery to render necessary technical advice in the matter.

Slaughter tapping and removal of old and uneconomic trees

Slaughter tapping of trees in Tagore, Fakruddin and Annie Besant blocks of the Estate was done. The details of trees given for slaughter tapping and the value realised is as follows:

Sl. No.	Name of Block	No. of trees	Rate at which sold	Value Rs.
1	Annie Besant Block	415	Rs. 251/tree	1,04,165.00
2	Fakruddin Block	432	Rs. 99.50/tree	42,984.00
3	Tagore Block	1282	Rs. 177/tree	2,26,914.00

(The trees were cut and removed by the contractors).

The Plantation in Kailas Block

The following seedlings/plants were planted in the Kailas block of Panchavadi Division of the Estate.

Teak	9200
Delonix regia	150
Bamboos	250
Cashew seedlings	280
Casuarina	1200

Expenditure and Receipts

A quantity of 28.56 tonnes of rubber was produced during the year and 22 tonnes were disposed of realising a value of Rs. 10,17,705.14. Old and uneconomical trees were cut and removed (2155 numbers) and from which an amount of Rs. 2,42,785.14 was received. There was a stock balance of 8171.21 kg of rubber as on 31-3-1985. The total expenditure during the year was Rs. 12,91,557.90.

CHAPTER VI

Finance & Accounts

Sri. N. M. Abdul Kadir continued as Comptroller till 2-11-84. On his reversion to Finance Department as Joint Secretary to Government, Sri. P. M. Krishnankutty Nair, Dy. Comptroller was in additional charge of Comptroller till his retirement on 31-12-84. From 1-1-85 onwards Sri. K. T. Narayanan Nambiar is continuing as Comptroller in charge.

For 1984-85, the University had approved a budget of Rs. 1526.46 lakhs (excluding Debt & Suspenses)—i. e. Rs. 896.5 lakhs under plan and Rs. 629.96 lakhs under non-plan against which the University had spent Rs. 617.68 lakhs and Rs. 462.42 lakhs under plan and non-plan respectively.

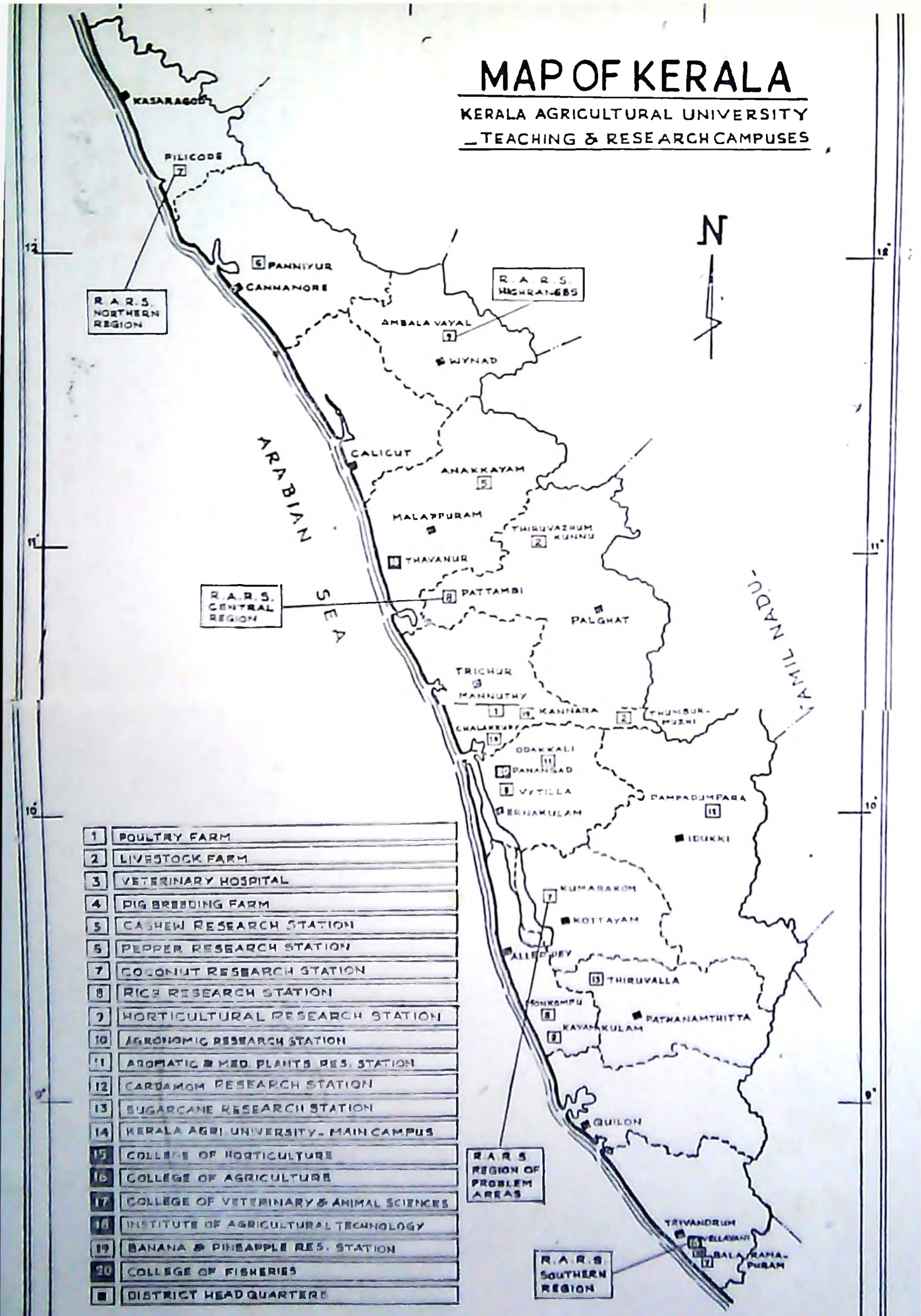
During 1984-85, Government has released Rs. 452.52 lakhs and Rs. 275 lakhs under non-plan and plan respectively. Income from University properties was Rs. 105.78 lakhs. ICAR had released Rs. 216.78 lakhs (including Rs. 68 lakhs for Developmental items) in 1984-85. Specific purpose grant of Rs. 7.35 lakhs has also received from Government for KADP.

Audit report for 1979-80 has been issued by the Government Auditor during the period under report. Audit certificate for 1981-82 in respect of externally aided projects were also issued.

MAP OF KERALA

KERALA AGRICULTURAL UNIVERSITY

_TEACHING & RESEARCH CAMPUSES



1	POULTRY FARM
2	LIVESTOCK FARM
3	VETERINARY HOSPITAL
4	PIG BREEDING FARM
5	CASHEW RESEARCH STATION
6	PEPPER RESEARCH STATION
7	COCONUT RESEARCH STATION
8	RICE RESEARCH STATION
9	HORTICULTURAL RESEARCH STATION
10	AGRONOMIC RESEARCH STATION
11	AROMATIC & MED. PLANTS RES. STATION
12	CARDAMOM RESEARCH STATION
13	SUGARCANE RESEARCH STATION
14	KERALA AGRI. UNIVERSITY - MAIN CAMPUS
15	COLLEGE OF HORTICULTURE
16	COLLEGE OF AGRICULTURE
17	COLLEGE OF VETERINARY & ANIMAL SCIENCES
18	INSTITUTE OF AGRICULTURAL TECHNOLOGY
19	BANANA & PINEAPPLE RES. STATION
20	COLLEGE OF FISHERIES
■	DISTRICT HEADQUARTERS

Representatives of post graduate students

Sri Abdul Kareem (81-11-24) M. Sc. (Ag) Student, Department of Agricultural Extension, College of Agriculture, Vellayani, Trivandrum.
Sri P. Madhu (81-11-24) P. G. student, Department of Plant Breeding, College of Horticulture, Vellanikkara.

Representatives of under graduate students

Sri E. P. Vijayan (79-01-135) UG student, College of Horticulture, Vellanikkara, Trichur.
Sri P. B. Prasad (81-03-62) B. V. Sc. & A. H. student, Veterinary College, Mannuthy, Trichur.

Representative of students of Diploma and Certificate courses

Sri P. V. Appukunhi (81-D1-47) D. A. Sc. student, Institute of Agrl. Technology, Tavanur, Malappuram Dist.

Representatives of Teachers of Faculties

Sri K. Sivasankara Pillai, Associate Professor, Coconut Research Station, Balaramapuram, Trivandrum Dist.
Sri C. G. Rajendran, Assistant Professor (Aqua), College of Fisheries, Panangad, Ernakulam Dist.
Dr A. Ramakrishnan, Professor of Poultry Science, College of Vety. & Animal Sciences, Mannuthy, Trichur.

Representative of Non-teaching Staff

Sri K. K. Damodaran, Senior Grade Typist, Kerala Agricultural University, Vellanikkara, Trichur.

Representatives of Presidents of Panchayats

Dr George Thomas, Puthenpura, Champakulam, Alleppey Dist.
Sri K. K. Surendran, Kottikkal House, Vellanikkara P. O., Trichur.
Sri B. M. Ramayya Shetty, Manjeshwar Panchayat, Manjeshwar P. O. Cannanore Dist.
Sri E. P. Sebastian, Edassery, Ayroor P. O., Ernakulam Dist.

Representative of Mayors of Corporations and Chairman of Municipal Councils

Sri K. Thankappan, Chairman, Quilon Municipality, Quilon.

MEMBERS NOMINATED BY THE CHANCELLOR

Agricultural Scientists

Dr. M. Aravindakshan, Head, Department of Pomology, College of Horticulture, Vellanikkara, Trichur.
Dr. K. Ramdas, Associate Professor, University Veterinary Hospital, Kokkalai, Trichur.

Farmers

Sri K. C. Sukumaran, Agriculturist, Navakkodekulam, Koduvayoor P. O., Chittur Taluk, Palghat Dist.

Sri C. S. Ramachandran Master, Chulliparambil P. O., Varantharapilly (Via) Alagappanagar, Trichur.
Sri Therampil Ramakrishnan MLA, Krishnakripa, Trichur–3
Sri Raghavan Pozhakadavil MLA, Karalam, P. O. (Via) Irinjalakuda, Trichur Dist.
Prof. Alexander Zacharias, St. Joseph's College, Devagiri, Calicut.

Co-operations

Sri O. Lukose, Ex. MLA, Arukuzhippil Kappumthala P.O.,Kaduthuruthy, Kottayam Dist.

Fisheries

Sri K. A. Latheef, KPCC (I) Office, Nandavanam, Trivandrum.

Animal Husbandry

Sri A. V. Hamza, Athakkaveedu House, Ponnani Nagaram P. O., Pin 679 583, Malappuram Dist.

Plantation Industry

Sri V. Kunhabdulla Hajee, Jazeeyal House, Kamampetta P. O., Wynad Dist.

Women Social worker

Smt Vijaya D. Nair, Mankuzhi House, Thalakulathur P. O., Calicut.

Engineer who has specialised in Agrl. Engineering or Irrigation.

Sri O. A. Mathew, Consulting Engineer, John & Mathew Engineers, Kottayam–686 001

Educationalist

Prof. K. J. Kurian, Thomas College, Moovattupuzha, Ernakulam Dist.

Representatives of Agricultural Labour

Sri J. Mathew, President, Kamampetta Panchayat, Varadoor P. O. Karani (Via) Kalpetta, Wynad Dist.
Sri K. P. Chelly, DKTF District Vice-President, Mankada P. O. Malappuram Dist.

Representative of Plantation Labour

Sri K. A. Kurien Master, Alakode P. O., Cannanore Dist.

Cochin University

Sri. P. K. Kamarudeen, University of Cochin, Cochin University P. O., Cochin-682022

Kerala University

Sri. S. Subramanian Potty, TC 13/1198-1, Sanskrit College Road, Palayam, Trivandrum.

Representative of Indian Council of Agricultural Research

Dr. R. M. Acharya, Deputy Director General (AS), ICAR, Krishi Bhavan, New Delhi.

THE EXECUTIVE COMMITTEE

Vice-Chancellor, Kerala Agricultural University	Chairman
Secretary to Government (Agri) and Agricultural Production Commissioner, Trivandrum	Member
Secretary to Government (Finance), Trivandrum	"
Secretary to Government, Development Department, Trivandrum	"
Dr. R. M. Acharya, Deputy Director General (AS) Indian Council of Agrl. Research, Krishi Bhavan New Delhi 110 001	"
Dr. N. Sadanandan, Dean, College of Agriculture, Vellayani, Trivandrum	"
Sri K. Sivasankara Pillai, Associate Professor, Coconut Research Station, Balaramapuram, Trivandrum	"
Prof. Alexander Zacharias, St. Joseph's College Devagiri, Calicut	"
Sri Theramgil Ramakrishnan MLA, Krishnakripa, Trichur-3	"
Sri Raghavan Pozhikkadavil MLA, Karalam P. O (Via) Iranjalakuda, Trichur	"
Sri A. V. Hamza, Athikkaveedu House, Ponnani Nagaram, P. O. Pin 679 583, Malappuram Dist	"

ACADEMIC COUNCIL

Members

Vice-Chancellor, Kerala Agrl. University, Vellanikkara

The Dean, College of Agriculture, Vellayani, Trivandrum

The Dean, College of Veterinary & Animal Sciences, Mannuthy.

The Dean, College of Fisheries, Panangad, Cochin.

The Director of Research, Kerala Agricultural University, Vellanikkara

The Director of Extension, Kerala Agricultural University, Mannuthy.

The Director of Agriculture, Vikas Bhavan, Trivandrum

The Director of Animal Husbandry, Kerala, Trivandrum.

The Registrar, Kerala Agricultural University, Vellanikkara.

The Director of Students Welfare, Kerala Agricultural University, Vellanikkara.

Dr R. S. Aiyer, Professor & Head, Department of Soil Science & Agrl. Chemistry, College of Agriculture, Vellayani, Trivandrum.

Dr K. C. George, Professor, Dept. of Statistics, College of Veterinary & Animal Sciences, Mannuthy.

Dr C. Sreedharan, Professor of Agronomy, College of Horticulture, Vellanikkara.

Dr G. Nirmalan, Professor & Head, Department of Physiology & Bio-chemistry, College of Vety & Ani. Sciences, Mannuthy.

Dr D. Manikantan Thampi, Professor of Aquaculture, College of Fisheries, Panangad, Ernakulam.

Dr K. V. Peter, Professor & Head, Department of Olericulture, College of Horticulture, Vellanikkara, Trichur.

Prof. T. F. Kuriakose, Project Co-ordinator (Rice), Agricultural Research Station, Mannuthy.

Dr G. T. Nair, Professor of Agrl. Extension, Krishi Vignan Kendra, Regional Agrl. Research Station, Pattambi.

Dr B. R. Krishnan Nair, Geneticist, AICRP on Goats, Mannuthy.

Most Rev. Benedict Mar Gregorios, Arch-Bishop of Trivandrum, Trivandrum.

Sri K. P. Padmanabha Kurup, Managing Director, Trivandrum Regional Co-operative Milk Producers' Union, Girija Bhavan Thycaud Trivandrum-695 014.

Dr M. Aravindakshan, Director, Centre of Excellence for Tree crops & Spices, College of Horticulture, Vellanikkara.

Dr K. V. Ahmed Bavappa, Director, CPCRI, Kasaragod

Dr (Mrs) P. Pushpamma, Dean, College of Home Science, Andhra Pradesh Agricultural University, Hyderabad.

Dr S. M. Ajinkya, National Professor of Eminence, Bombay Vety. College, Parel, Bombay

Dr P. Basak, Advisor and Dean i/c., Kelappaji College of Agrl. Engineering & Technology, Tavanur

Dr C. R. Raju, Agricultural Scientist, Central Plantation Crops Research Institute, Kasaragod

Sri Jose Joseph (83-11-50), PG Student, Department of Plant Pathology, College of Agriculture, Vellayani, Trivandrum

Sri R. Gopinathan, Research Student, Department of Agronomy, College of Horticulture, Vellanikkara, Trichur

Dr George Koshy, Associate Professor, College of Agriculture, Vellayani, Trivandrum

Dr P. Rabindranath, Associate Professor, College of Fisheries, Panangad, Cochin

Dr P. C., Alex Assistant Professor, College of Veterinary & Animal Sciences, Mannuthy.

The Associate Dean, College of Horticulture, Vellanikkara.

The Associate Dean i/c., College of Co-operation & Banking, Mannuthy.

Sri T. P. George, Professor of Agrl. Engineering, College of Horticulture, Vellanikkara.

Dr L. Prema, Associate Professor i/c., Professor of Home Science, College of Agriculture, Vellayani.

Sri SMA Aslam, Special Officer (Forestry), KAU Vellanikkara.

Sri K. K. Nair, I. F. S. (Retd), Komath House, Cannanore Road, Calicut-673 011.

Dr R. Kalyanasundaram, Director, Centre of Excellence for Research in Animal Diseases, College of Veterinary & Animal Sciences, Mannuthy.

BOARD OF STUDIES

FACULTY OF AGRICULTURE

Dean, Faculty of Agriculture — Chairman

Heads of Departments under the Faculty (15 Nos) — Members

Agronomy,
Agrl. Entomology,
Agrl. Engineering,
Agrl. Statistics
Plant Pathology
Plant Breeding
Pomology, Floriculture & Landscaping
Processing Technology
Agrl. Botany
Agrl. Economics
Agrl. Extension
Horticulture
Soil Science & Agrl. Chemistry
Plantation Crops
Olericulture

Two specialists

Dr. S. Subramoniam, Professor & Head of Department of Agronomy, Tamil Nadu Agrl. University, Coimbatore-641 003.

Dr. R. Gopalakrishnan, CWRDM, Calicut.

Such other members

Dr. E. Tajudeen, Professor, Cropping System Res. Centre, Karamana.

Sri. K. Sivasankara Pillai, Assoc. Professor, CRS Balaramapuram.

Special invitees

Director of Agriculture, Trivandrum

Assoc. Dean, College of Horticulture, Vellanikkara.

Prof. C. A. Jose, Assoc. Dean i/c. College of Co-operation & Banking, Mannuthy.

Director, Institute of Agrl. Technology, Tavanur.

FACULTY OF VETERINARY & ANIMAL SCIENCES

Dean, Faculty of V & AS — Chairman

Heads of Departments under the Faculty (18Nos) — Members

Anatomy

Animal Management

Clinical Medicine

Extension

Nutrition

Pathology

Physiology & Biochemistry

Preventive Medicine

Surgery

Animal Breeding & Genetics

Animal Reproduction

Dairy Science

Microbiology

Parasitology

Pharmacology

Poultry Sciences

Statistics

Veterinary Public Health

Two specialists

Dr. P. Kothandaraman, Dean, Madras Veterinary College, Madras-7

Dr. P. G. Nair, Head, Southern Regional Station, NDRI, Bangalore-560 030

Such other members

Dr. K. Radhakrishnan, Professor, Research Co-ordination College of Veterinary & Animal Sciences, Mannuthy

Dr A. Ramakrishnan, Professor, Poultry Science, Veterinary & Animal Sciences, Mannuthy

Special invitees

Director of Animal Husbandry, Trivandrum

Director of Dairy Development, Trivandrum

Associate Director of Research (Veterinary), Vellanikkara

FACULTY OF FISHERIES

Dean, Faculty of Fisheries — Chairman

Heads of Departments under the Faculty (7 nos) — Members

Aquaculture

Fishery Hydrography

Fishing Technology

Management Studies

Fishery Biology

Processing Technology
Fisheries Engineering.

Two specialists

Prof. HPC Shetti, Director of Instruction, Faculty of Fisheries, Mangalore.

Prof. G. S. Sharma, Head of Department, Marine Sciences, Cochin University, Foreshore Road, Ernakulam.

Such other members

Dr. P. M. Mathew, Professor, Fisheries College, Panangad

Sri C. G. Rajendran, Asst. Professor (Aquaculture) College of Fisheries, Panangad.

Special invitees

Director of Fisheries, Trivandrum

Managing Director, Kerala Fisheries Corporation, Cochin-682 031

Managing Director, Kerala Inland Fisheries Development Corporation Cochin-682 018.

Appendix II

SUB COMMITTEES OF THE EXECUTIVE COMMITTE E

FINANCE COMMITTEE

Vice-Chancellor	Chairman
Secretary, Finance	Member
Secretary to Government & Agrl. Production Commissioner	,,
Sri. Therambil Ramakrishnan, MLA	,,
The Comptroller	Convenor

PLANNING AND DEVELOPMENT COMMITTEE

Vice-Chancellor	Chairman
Secretary to Government & Agrl. Production Commissioner	Member
Sri Raghavan Pozhakadavil, MLA	,,
Sri Therambil Ramakrishnan, MLA	,,
Prof. Alexander Zacharias	,,
Sri K. Sivasankara Pillai, Assoc. Professor	Member-Convenor

RESEARCH REVIEW SUB COMMITTEE

Vice-Chancellor	Chairman
Sri Raghavan Pozhakadavil, MLA	Member
Sri Therambil Ramakrishnan, MLA	,,
Prof. Alexander Zacharias	,,
Sri A. V. Hamza	,,
The Director of Research	Member-Convenor

SPORTS BOARD

Vice-Chancellor	Chairman
Chairman of the Students Welfare Committee	Member
Deans of Faculties & Associate Dean (Hort)	,,
Registrar	,,

Note: The Director of Research and/or the Dean (s) may be invited whenever considered necessary

Sri K. Sivasankara Pillai, Assoc. Professor	Member
Secretary Athletic Association of the respective Colleges/Institute	"
Student members in the General Council	"
Director, IAT Tavanur	"
Junior Asst. Professor (Phy. Edn.) or Officers i/c of sports	"
Dy. Director of Students Welfare (S & G)	Member-Convenor

ESTABLISHMENT COMMITTEE

Prof. Alexander Zacharias	Chairman
Sri Raghavan Pozhakadavil, MLA	Member
Sri Therambil Ramakrishnan, MLA	"
Sri A. V. Hamza	"
Dr N. Sadanandan, Dean (Ag)	"
Sri K. Sivasankara Pillai, Associate Professor	"
The Registrar	Convenor

STUDENTS WELFARE COMMITTEE

Sri Raghavan Pozhakadavil, MLA	Chairman
Sri Therambil Ramakrishnan, MLA	Member
Prof. Alexander Zacharias	"
Sri A. V. Hamza	"
Sri K. Sivasankara Pillai, Assoc. Professor	Member-Convenor

WORKS COMMITTEE

Vice-Chancellor	Chairman
Sri A. V. Hamza	Member
Sri Raghavan Pozhakadavil, MLA	"
The Dean, Faculty of Agriculture	"
Director of Physical Plant	Member-Convenor

SUB COMMITTEES OF THE GENERAL COUNCIL

STATUTE COMMITTEE

Prof. Alexander Zacharias, St. Joseph's College, Devagiri, Calicut	Chairman
Dr A. Ramakrishnan, Prof. of Poultry Science, College of Vety. & Ani. Sciences, Mannuthy	Member
Sri K. K. Damodaran, Senior Grade Typist Kerala Agrl. University, Vellanikkara	
Sri K. Sivasankara Pillai, Assoc. Professor, Coconut Research Station, Balaramapuram, Trivandrum Dist.	

Sri. Raghavan Pozhakadavil MLA, Karalam P. O. (Via) Irinjalakuda, Trichur Dist.	Member
Sri C. G. Rajendran, Asst. Professor (Aqua) College of Fisheries, Panangad, Ernakulam Dist.	"
Sri C. Krishnan Nair, President, Pilicode Panchayath, Pilicode P. O. Cannanore Dist. 670353	"
Sri Therambil Ramakrishnan MLA, Krishnakripa, Trichur Dist.	"
Registrar, KAU Vellanikkara	Member-Convenor

ASSURANCE COMMITTEE

Sri O Lukose, Ex. MLA, Arukuzhippil, Kappumthala P O Kaduthuruthy, Kottayam Dist.	Chairman
Smt Vijaya D. Nair, Madathil House, P. O. Thalakulathur, Calicut	Member
Sri K. P. Chelly, DKTF Dist. Vice-President, P. O. Mankada, Malappuram Dist	"
Sri K. K. Surendran, Koitkkal House, Vellanikkara P. O., Trichur Dist.	"
Sri K. A. Kurien Master, P. O. Alakode, Cannanore Dist	"

ACCOUNTS COMMITTEE

Prof. K. J. Kurien, Nirmala College, Moovattupuzha Ernakulam Dist	Chairman
Sri. J. Mathew, President, Kaimanpetta Panchayath, P. O. Varadoor, Karam [illegible], Kalpetta, Wynad Dist.	Member
Sri K. A. Latheef, Puthenpurakkal P. O. Thrikkunnapuzha Alleppey Dist.	
Dr M. Aravindakshan, Prof. & Head, Department of Pomology, College of Horticulture, Vellanikkara	"
Sri S. Subramanian Potty, TC-10/1198/1 Sanskrit College Road, Palayam, Trivandrum	"

RESEARCH COUNCIL

Vice-Chancellor, Kerala Agrl. University	Chairman
Director of Research, Kerala Agrl. University	Secretary
Director of Extension, Extension Directorate, Mannuthy	Member
Dean, Faculty of Agriculture, College of Agrl. Vellayani-695 522	"
Dean, Faculty of Vety. & Animal Sciences, Mannuthy	"
Dean, Faculty of Fisheries, Panangad-682 506	"

Associate Dean, College of Horticulture, Vellanikkara-680 654	Member
Dr S. Kedarnath, Director, Kerala Forest Research Institute, Peechi 680 653	"
Director of Research, Tamil Nadu Agricultural University, Coimbatore-641 003	"
Dr P. Basak, Advisor & Dean i/c, Kelappaji College of Agrl. Engineering & Technology, Tavanur	"
Director, Central Plantation Crop Research Institute Kasaragod-679 124	"
Dr V. K. Vasudevan, Head, Water Management Kunnamangalam, Calicut 673 571	"
Prof. Alexander Zacharias, St. Joseph's College Devagiri P. O., Calicut	"
Sri Theruvath Ramakrishnan, M.L.A. Kochukaruppa Irichur-3	"
Prof. K. J. Kurien, Nirmala College, Moovattupuzha	"
Mr. K. Sivasankara Pillai, Associate Professor Coconut Research Station, Kattachalkuzhi P. O. Balaramapuram, Trivandrum Dist	"
Sri O. Luckose, Ex. MLA Arookuzhippil Muttathara Kappumthala P. O., Kuduthuruthy (Via) Kottayam Dist	"

CO-OPTED MEMBERS (AGRI)

Prof. (Research Co-ordination), College of Agriculture, Vellayani

Director of Agriculture, Kerala State or his nominee

Sri P. S. D. Nair, Retd. Additional Director of Agriculture, DII/1828, Jai Gokul, Brigadier Lane, Trivandrum-695 033

Managing Editor, Agricultural Research Journal of Kerala, College of Horticulture, Vellanikkara

Associate Director of Research (M&E), Directorate of Research

Associate Director of Research (AR&T), Directorate of Research

Associate Director of Research (Plg) Directorate of Research

CO-OPTED MEMBERS (VETY & ANIMAL SCIENCES)

Professor (RC), College of Veterinary & Animal Sciences, Mannuthy

Director of Animal Husbandry, Vikas Bhavan, Trivandrum.

Director of Dairy Development, Pattom, Trivandrum-4.

Associate Director of Research (V&AS), Directorate of Research, Vellanikkara.

Editor, Kerala Journal of Vety. Research, Veterinary College, Mannuthy.

Dr. M. N. Menon, Retired Animal Husbandry Commissioner to Govt., of India, 'Anuradha', Peroorkada, Trivandrum-695 005.

Dr. A. Ramakrishnan, Professor & Head, Department of Poultry Science, College of Veterinary & Animal Sciences, Mannuthy.

CO-OPTED MEMBERS (FISHERIES FACULTY)

Prof. C. T. Samuel, Department of Industrial Fisheries & Marine Sciences, University of Cochin, Foreshore. Road, Cochin-682 016.
Dr. KH Alikunhi, Retd. Fisheries Advisor to Government of Kerala, Crescent Hatchery & Prawn Farm, Alamanar, Eriyad, Kodungallur.
Professor (Fisheries Research), College of Fisheries, Panangad.

CO-OPTED MEMBERS (OTHERS)

Dr. K. T. Vijaya Madhavan, Head of Department of Zoology, St. Joseph's College, Devagiri, Calicut.
Dr. K. Raghavan Nambiar, Department of Civil Engineering, College of Engineering, Trichur-680 309.
Mr. K. K. Nair, Managing Director, Kerala Wood Industries Ltd., Karunalayam, Calicut-673 001.
Sri. SMA Aslam, Special Officer, for Faculty of Forestry, Kerala Agricultural University Headquarters, Vellanikkara.
Dr. PKG Panicker, Director, Centre for Development Studies, Ulloor, Trivandrum-695 011

FACULTY RESEARCH COMMITTEES

AGRICULTURE

Chairman

Dr. P. C. Sivaraman Nair, Director of Research KAU

University Officers & Head of Institution (3)

Dr. AGG Menon, Director of Extension Education
Kerala Agricultural University, Mannuthy
Dr. N. Sadanandan, Dean, College of Agriculture, Vellayani
Dr. P. K. Gopalakrishnan, Associate Dean, College of Horticulture, Vellanikkara

Associate Directors

Associate Director of Research (AR&T) Directorate of Research, Vellanikkara	Sri. P. N. Pisharody
Associate Director of Research (M&E) Directorate of Research, Vellanikkara	Dr. C. C. Abraham
Associate Director of Research (Plg.) Directorate of Research, Vellanikkara	
Associate Director NARP (High Range Region) Regional Agrl. Research Station, Ambalavayal	Prof. K. Kannan
Associate Director, RARS, Pattambi	Prof. N. Rajappan Nair
Associate Director, NARP (Southern Region) College of Agriculture, Vellayani	
Professor, of Agronomy, RARS, Kumarakom	Prof. U. Muhammed Kunju

Project Co-ordinators (17)

Rice	Prof. T. F. Kuriakose, Professor of Agronomy, Agrl. Research Station, Mannuthy
Spices	Dr. Abi Cheeran, Prof. of Horticulture (Pepper), College of Horticulture Vellanikkara.
Cocoa & Beverage crops	Dr. R. Vikraman Nair, Prof. of Horticulture (Cocoa), College of Horticulture, Vellanikkara.
Cashew	Prof. K. K. Vidhyadharan, Prof. of Horticulture (Cashew) College of Horticulture, Vellanikkara.
Fruits & Floriculture	Dr. M. Aravindakshan, Special Officer & Head, Department of Pomology, College of Horticulture, Vellanikkara.
Pulses & Oilseeds	Dr. V. Gopinathan Nair, Prof. of Plant Breeding, College of Agriculture, Vellayani.
Essential Oils & Medicinal Plants	Dr. S. Ramachandran Nair, Professor, Department of Plantation Crops College of Horticulture, Vellanikkara.
Post Harvest Technology & Nutrition	Prof. K. K. Vidhyadharan Prof. of Horticulture (Cashew), KADP College of Horticulture, Vellanikkara.
Sugarcane, Cotton & Misc. Crops	Prof. K. M. N. Namboodiri, Prof. of Agrl. Botany, College of Horticulture, Vellanikkara.
Fodder crops	Dr. C. Sreedharan, Prof. of Agronomy, College of Horticulture, Vellanikkara.
Plant Protection	Dr. N. Mohandas, Prof. of Entomology, College of Agriculture, Vellayani.
Soils & Agronomy	Dr. P. Padmaja, Professor (Project Coordinator) Soils & Agronomy, College of Horticulture, Vellanikkara.
Farm Economics & Extension	Dr. V. Radhakrishnan, Prof. of Agrl. Economics, College of Horticulture, Vellanikkara.

Cropping Patterns & Farming Systems	Dr. V. K. Sasidhar, Prof. Department of Agronomy, College of Agriculture, Vellayani.
Vegetables & Tuber Crops	Dr. K. V. Peter, Prof. Department of Olericulture, College of Horticulture, Vellanikkara.
Coconut & Arecanut	Prof. K. Kannan, Associate Director, Regional Agrl. Research Station, Ambalavayal.
Soil Conservation and Farm mechanisation	Prof. T. P. George, Professor, Department of Agrl. Engineering, College of Horticulture, Vellanikkara.

Heads of Departments other than project co-ordinators

Professor, Department of Soil Science & Agrl Chemistry, College of Agriculture, Vellayani.	Dr. R. S. Aiyer
Professor, Department of Plant Pathology, College of Agriculture, Vellayani.	Dr. M. C. Nair
Professor (Stat) College of Vety. & Animal Sciences, Mannuthy.	Dr. K. C. George
Professor, Department of Agrl. Extension, College of Agriculture, Vellayani.	Dr. A. M. Thampi
Professor, Department of Horticulture, College of Agriculture, Vellayani	

Others

Director, Institute of Agrl. Technology Tavanur, Malappuram Dist	

Secretary

Professor (Research Co-ordination), College of Agriculture, Vellayani.	Dr M M Koshy

VETERINARY & ANIMAL SCIENCES

Director of Research, Kerala Agrl. University	Chairman
Dean, Faculty of Veterinary & Animal Sciences	Member
Director of Extension, KAU	,,
Assoc. Director of Research (V & AS)	,,
Heads of Departments in the Faculty of Vety. & Animal Sciences	,,

Dr. S. Sulochana, Assoc. Professor, Department of Microbiology.	Member
Professor (Farms)	,,
Dr. A. Venugopalan, Professor (Res. Coordination)	Secretary & Convenor

VARIETY EVALUATION COMMITTEE

Director of Research, Kerala Agrl. University	Chairman
Director, CTCRI, Trivandrum or his nominee	Member
Director, CPCRI, Kasaragod or his nominee	,,
Director of Agriculture, Trivandrum or his nominee	,,
Director of Extension, Kerala Agrl. University	,,
Professor of Agronomy, College of Agri., Vellayani	,,
Professor of Plant Pathology, College of Agri., Vellayani	,,
Professor of Agricultural Botany, College of Agriculture, Vellayani.	,,
Professor of Horticulture, College of Agri., Vellayani	,,
Professor of Entomology, College of Agri., Vellayani	,,
Associate Director, RARS, Pattambi	,,
Associate Director, RARS, Pilicode	,,

THE POST GRADUATE COMMITTEE

Vice-Chancellor, Kerala Agrl. University	Chairman
Dean, Faculty of Agriculture, KAU	Member
Dean, Faculty of Vety & Animal Sciences, KAU	,,
Director of Extension, KAU	,,
Director of Research, KAU	,,
Associate Dean, College of Horticulture, KAU	,,
Dr. A. Venugopalan, Professor (Research Coordination) Faculty of Veterinary & Animal Sciences, KAU	,,
Dr. M. M. Koshy, Professor (Research Co-ordination) Faculty of Agriculture KAU	,,
Registrar, KAU	Convenor

Appendix III

LIST OF STAFF AT THE HEADQUARTERS

Vice-Chancellor	:	Sri. T. Madhava Menon, IAS
Registrar	:	Sri Thomas C. George IAS
Comptroller	:	Sri N. M. Abdul Kadir (till 12.11.84)
		,, P. M. Krishnan Kutty Nair i/c (upto 31.12.84)
		,, K. T. Narayan Nambiar i/c (from 1.1.85)
Deputy Registrar (Acad)	:	Sri C. K. Ramakrishnan
Deputy Registrar (Admn)	:	Sri P. M. Krishnan Kutty Nair
Assistant Registrar (Admn)	:	Sri P. V. Karunakaran Nair
Assistant Comptroller	:	Smt V. A. Saraswathy Bai
Assistant Comptroller	:	Sri P. C. Raveendran Pillai
Assistant Comptroller	:	Smt K. Padmavathy
Financial Assistant	:	Sri K. I. Alex
Labour Officer	:	Sri C. N. Muraleedharan Nair
Recruitment Officer	:	Sri P. M. Chandran
Secretary to Vice-Chancellor	:	Sri K. U. Abdul Kadir
PA to Registrar	:	Sri A. K. Abdul Kadir
Section Officers	:	Sri Sheik Abdul Karim
		Smt B. Syamala Devi
		,, V. Chandrika
		,, K. Subhashini
		Sri V. R. Sankarankutty
		,, V. C. Bharathan Pillai
		Smt D. A. Syamala
		Sri P. X. Francis
		,, T. Aravindan
		,, K. Chandramohanan
		,, M. Nakulan
		,, R. Gangadharan
		,, S. Bhaskara Pillai
		,, K. Kunhoosa
		,, K. K. Parameswaran

		Smt C. Rajamma
		Sri P. Gopinathan
		Smt V. V. Radhamma
		Sri K. K. Subramonian
		Smt E. K. Bharathy
		,, T. A. Zainaba Beevi
Senior Office Superintendents	:	Sri P. P. Gangadharan
		,, P. Govindankutty Menon
		Smt Subaida Beevi
		Sri O. U. Chandran
Office Superintendent	:	Smt V. B. Leelavathy Amma
Senior Grade Assistants	:	Sri K. P. Sreedharan
		,, K. P. Ramachandran Nair
		Smt V. J. Rosily
		Sri P. M. Balakrishnan
		,, N. K. Achuthan
		Smt P. V. Nalini
		,, P. A. Lakshmi
		,, A. D. Omana
		Smt Vivian Jose
		Sri M. N. Vijayakumar
		Smt K. P. Narayanikutty
		,, Susy Mathew
		,, K. P. Saramma
		Sri N. Vijayakumar
		,, K. K. Radhakrishnan
		Smt K. Thankam
		Sri P. K. Manikutty
		,, P. V. Sreekumaran
		,, K. I. Chakkunny
		Smt Shirly Bai George
Grade I Assistants	:	,, B. Sarasamma
		,, R. Thankamani
		Sri A. Abdul Majid
		Smt. R. Vasumathy
		,, N. Usharani
		Sri P. V. Raveendran
		Smt M. A. Urmila Devi
		,, C. Mercy John
		Sri A. Abdul Karim
		,, K. A. Varied
		,, M. Radhakrishnan
		Smt K. N. Lalithamma
		Sri K. R. Suresh
		,, S. Ramachandran Nair

Assistant Grade I	:	Smt V. Chellamma
		,, T. K. Ambika
		Sri M. P. Govinda Pillai
		Smt M. Jeseentha
		,, C. Usha
Assistant Grade II	:	Sri K. C. Joseph
		Kumari C. R. Rethi
		Smt Mary Joseph
		Sri N. P. Valsan
		Smt P. A. Geetha
		Sri K. Dinesan
		Smt P. Sreelatha
		Sri P. L. Tony
		Smt P. K. Pushpaja
		Sri T. Jagadeesan
		Smt A. Daisy Anto
		Sri M. E. Rajan
		Smt M. A. Sujatha
		,, S. Vasanthakumari
		Sri N. V. Unnikrishnan Nair
		Smt T. B. Latha
		Sri. P. T. George
		Sri P. Gopinathan Nair
Senior Grade Typist	:	Sri V. P. Asokan
		,, R. Sadan
		Smt P. R. Sarojini
		,, M. A. Bhargavi
Typist Grade I	:	Smt K. B. Girija
		Sri K. J. Lonan
		Smt K. M. Mary
		,, K. A. Valsala
		,, K. K. Mary
		,, P. K. Sreedevi Amma
		Sri I. A. Surendran
Binder Grade II	:	Sri R. Vijayan
KAU School Teachers		
		Sri V. Sasidharan
		,, P. K. Bhaskaran
		Smt M. A. Alli
		,, K. P. Thressiamma
		,, Deborah Cyril
		,, Marykunju Thomas
		,, Latha Balaraman
		,, A. J. Lilly
		,, K. S. Indira Devi

Driver (H. D. V.)	:	Sri P. M. Youseph
		,, V. R. Kochu
		,, T. K. Govindan
		,, V. N. Sankarankutty
Driver (LDV)	:	Sri M. K. Rajendran
		,, C. P. Karunakaran Nair
		,, Mohammedkutty
		,, C. L. Antony
		,, K. A. Jebbar
		,, K. O. John Stephen
		,, P. Reghunathan Nair
Bus Attendant	:	Sri K. S. Narayanan
		,, K. A. Abdul Rasheed
		,, V. M. Sankaranarayanan
		,, V. A. Ouseph
Duplicator Operator	:	Sri P. A. Francis
		,, A. V. Poulose
Duffedar	:	Sri T. S. Keralavarman
Peon	:	Sri C. O. Varunny
		Smt K. Kalliani
		,, P. D. Rosa
		Sri V. Narayanan
		,, John Mendez
		,, E. K. Padmanabhan
		,, M. K. Gangadharan
		,, V. Krishnan
		Smt P. V. Devoo
Sweeper-cum-Attendant	:	Smt K. K. Chandra
		,, K. L. Fatima Beevi
		Sri V. I. Balan
Watchman	:	Sri Silak Bahadur
		,, M. Nara Bhadur
Clerical Assistant	:	Smt M. M. Kamani
		Sri T. N. Aravindakshan
Lab Assistant	:	Smt A. N. Saraswathi
Cook-cum-Caretaker	:	Sri Sankara Pillai
Sweeper-cum-Scavenger	:	Smt M. O. Kochannam
Sweeper-cum-Attendant	:	Smt T. R. Annamma
Aya	:	Smt Soudamini M.
		,, S. Indirakumari
		,, K. R. Sumithra

Peon	:	Sri K. Girish Babu
		,, S. Parameswaran Nair
		Smt C. P. Kousallya
		,, Santhakumari
		Sri K. Govindankutty
		,, V. Sankaran
		Smt. A. N. Saraswathi

DIRECTORATE OF RESEARCH

Director of Research	:	Dr P. C. Sivaraman Nair
Associate Directors	:	Dr R. K. Sundaram (upto 9-10-84)
		Dr C. C. Abraham
		Prof. P. N. Pisharody
		Dr M. Subramaniam
Associate Director i/c	:	Dr (Mrs) Mary K. George
Assistant Professor (Ag. Stat.)	:	Sri P. Gangadharan
Section Officers	:	Smt C. Rajamma (upto 13-8-84)
		,, P. N. Sudhadevi
Senior Grade Assistant	:	Sri V. Viswambharan
		Smt V. K. Pathumma
Grade I Assistant	:	Smt P. E. Haleema Beevi
		Sri K. Subramanian
		Sri K. Haridas
Senior Grade Typist	:	Smt T. Valsala
		Sri. K. K. Damodaran
		Smt P. Subhashini
Typist Grade I	:	Smt K. Saraswathy Amma
		,, S. Akhileswari
		Sri S. Sudhakaran Nair
Duplicator Operator	:	Sri I. R. Govindan
Driver (LV)	:	Sri K. P. Jose
		,, V. Gopalakrishnan
Higher Grade Peon	:	Sri C. C. Volukutty
Peon	:	Sri P. K. Bhaskaran
		Smt V. C. Ammini
Assistant Grade I	:	Sri P Unnikrishnan (upto 31-5-84)
		,, P. Janardhanan (upto 28-5-84)
Driver (LV)	:	Sri K. V. Kochappan (upto 17-5-84)

DIRECTORATE OF EXTENSION

Director of Extension	:	Dr A. G. G. Menon
Associate Director of Extension	:	Dr G. R. Nair
Editor (Publications)	:	Sri Ravi Varma Ravi Appan Thampuran

Farm Advisory Service

Professor (Plant Protection)	:	Dr M. J. Thomas
Professor (Agronomy)	:	Sri A. I. Thomas
Associate Professor (Agronomy)	:	Sri E. P. Koshy
Associate Professor (Horti)	:	Sri N. Ramachandran Nair
Associate Professor (Poultry Science)	:	Dr G. Reghunathan Nair
Associate Professor (Plant Protection)	:	Dr K. Sasidharan Pillai

Communication Centre

Assistant Professor (Infor)	:	Dr C. Bhaskaran
Assistant Professor	:	Sri Joy Mathew
Assistant Professor (Animal Science)	:	Dr Sabu Kuruvilla
Junior Assistant Professor	:	Smt P. S. Geethakutty

Publication Unit

Associate Professor (Publications)	:	Sri K. C. Varghese
Assistant Professor	:	Sri Ranjan S. Karippai
Assistant Professor (Animal Science)	:	Dr (Mrs.) Amritha Viswanath
Assistant Professor (Fisheries)	:	Dr K. G. Padmakumar
Language Editor Malayalam	:	Smt K. Mridula Devi

Exhibition and Graphic Service Unit

Assistant Professor	:	Smt N. P. Kumari Sushama
Junior Assistant Professor	:	Sri G. Surendran

Training Service Scheme, Mannuthy

Assistant Professor	:	Sri F. M. H. Khaleel

Supporting staff

Section Officer	:	Sri K. R. Mohanan
		Smt B. Syamala Devi
Steno to DEE	:	Sri K. Sadasivan Nair
Steno to ADE	:	Sri P. I. Ittoop
Senior Grade Assistant	:	Sri K. V. Sugunan
		Smt P. K. Elsy (from 1-9-84)
		,, K. P. Mary
Grade I Assistant	:	Smt N. Kunhilakshmi
		,, P. Vijayakumari
Assistant Grade II	:	Smt K. N. Chandralekha
		,, E. Hymavathy
		,, N. V. Thankom

Typist Grade I	:	Sri P. N. Savithri
Chief Artist	:	Sri G. Gopinathan Nair
Technician Grade II	:	Sri K. Sukumaran
Artist	:	Sri P. S. Kesavan Namboodiri
Dark Room Assistant	:	Sri A. Sulaimankutty
Farm Assistant(Agri)	:	Smt K P Ambika
		Sri K. Gopalakrishnan
Driver	:	Sri T. G. Mohanan
		,, P. K. Sashidharan
		,, M. R. Gopinathan
Driver (HV) Grade II	:	Sri K. V. Kochappan
Duplicator Operator	:	Sri C. A. Divakaran
Peon	:	Sri C. R. Chandran
		Smt V. S. Bhargavi
		,, M S. Ammini
Watchman	:	Sri Silak Mahadu

Training Service Scheme, Thavanur

Assistant Professor	:	Sri P. Muhammed
Farm Assistant Senior Grade	:	Sri N. Saidalikutty
Typist Grade II	:	Smt A. J. Mary

Training Service Scheme, Vellayani

Assistant Professor	:	Smt G. Sobhana
Typist Senior Grade	:	Smt C. Padmavathy
Farm Assistant (Agri)	:	Smt J. Vimala Bai

Krishi Vignan Kendra, Pattambi and Ambalavayal

Professor	:	Dr G. T. Nair
Associate Professor	:	Dr M. N. C. Nair
		Sri P. J. Ittyavera
Associate Professor (Animal Science)	:	Dr U. T. Francis
Associate Professor (Home Science)	:	Smt Chandra Latha
Assistant Professor (Poultry)	:	Dr O. J. George
Assistant Professor (Fisheries)	:	Dr G. S. Naryanan
Assistant Professor (Hort)	:	Dr P. C. Rajendran
Junior Assistant Professor	:	Smt Sheenu S. Nair
Section Officers	:	Sri R. Rajendran Unnithan
		Sri K. Sivanandan
Assistant Grade II	:	Smt Leelamma Augustine

Typist Grade II	:	Smt V. K. Rosy
Farm Assistant Grade II	:	Sri C. G. Pradeep
		,, David Dharamkumar
Driver	:	Sri T. R. Sashidharan
Peon	:	Sri T. Ramachandran
Hostel Attendant	:	Sri P. K. Govindan
Watchman	:	Sri Kumaran

Scheduled Caste area Research Centre Nilambur (AICRP)

Asst. Professor (Extn)	:	Sri P. Rajendran
Junior Assistant Professor (Home Economics)	:	Sri Vijayakumar
Typist Grade II	:	Smt K. Girija
Driver Grade II	:	Sri E. P. Narayanan (from 4-6-84)

Tribal Area Research Centre, Amboori

Co-ordinator	:	Dr R. S. Iyer
Associate Professor	:	Sri P Ramachandran Nair
Assistant Professor	:	Sri N Sreekumaran
Assistant Professor (Animal Husbandry)	:	Dr M. R. Rajan
Assistant Professor (Home Science)	:	Smt C. Nirmala
Assistant Professor (Small Scale Industries)	:	Sri G. Mohanan
Assistant Professors (Health)	:	Dr U. N. Radhakrishnan
		,, N. Madhuri Devi
Junior Assistant Professors	:	Sri Rari John
		Sri Pious
Clerk-cum-Typist	:	Smt Ponmani Mohana
Driver	:	Sri Balachandran

National Demonstration Scheme, Sadanandapuram

Professor (PP)	:	Sri G. Indrasenan
Assistant Professor (SS)	:	Sri K. Raveendran Nair
		,, I. Johnkutty
Farm Assistant	:	Sri P. K. Rajasekharan
		Smt K. S. Sujatha
Driver	:	Sri P. S. Babu

Lab-to-land Programme & Village Adoption Programme

Co-ordinator		Prof. A. I. Thomas

KAU Press

Press Manager	:	Sri K. Rajappan
General Foreman	:	Sri G. Narayana Pillai
Senior Foreman	:	Sri P. I. Lonappan
Proof Readers	:	Smt Sherly Sam
		Sri K. K. Sadasivan
Computor	:	Smt K. Santhakumari
Printers (UG)	:	Sri T. P. Joseph
		,, V. R. Kumaran
Printers (LG)	:	Sri C. Viswanathan
		,, P. R. Aravindakshan
		,, N. J. Samuel
		,, P. Prabhakaran
Compositors (UG)	:	Sri V. Subramanian
		Smt K. M. Thankamma
Compositors (LG)		Smt P. A. Elsy
		Sri [illegible] Rajendran
		Smt K. Leela
Binder (UG)	:	Sri [illegible] R. Vijayan
Binders (LG)		Smt P. T. Annie
		,, M. Kamalamma
		,, S. Sarojini Amma
Helper		Smt P. Prasannakumari
Section Officer		Sri P. V. Gopalakrishnan
Senior Grade Assistants		Sri K. A. Mohammed
		Smt K. M. Mary
		Sri K. R. Dilipkumar
Office Superintendent		Sri O. U. Chandran
Peon		Sri I. Govindankutty

DIRECTORATE OF PHYSICAL PLANT

Director of Physical Plant		Sri K. G. Krishna Pillai
PA to DPP		Smt Elizabeth Thomas
Financial Assistant		Sri K. I. Alex
Asst. Engineer		Smt I. L. Elsy
Section Officers		Sri A. Basil
		,, C. Sasikumaran Nair
Senior Grade Assistants		Sri P. J. John
		Smt C. V. Santha
		,, M. K. Shailaja
		,, A. K. Lyla
		Sri M. N. Sasidharan

Assistants Gr. I	:	Sri V. A. Achuthan
		Smt E. K. Prabhavathy
Assistant Gr. II	:	Smt K. S. Vijayalakshmi
Senior Office Supdt	:	Sri T. K. Prabhakaran
Office Supdt.	:	Sri V. T. Kurien
Typists Gr. I	:	Smt S. Sudha Devi
		Smt S. Radhamma
		Smt P. Sarojini Ammal
Typist Gr. II		Smt T. K. Sukumari
Driver Gr. I		Sri P. K. Sasi
Blue Printer cum-Stores Operator		Sri T. T. Ousephunny
Peon		Sri C. V. Vijayan
		,, K. C. Krishnan
		,, V. A. Pareeth
		Smt V. Saraswathy

Division and Sub divisions of the Engineering Wing

Executive Engineer		Sri P. O. Thomas
Assistant Executive Engineers	:	Sri K. Antony Francis
		,, T. K. Rajan
		,, M. N. Raghavan
		,, M. Thomas Mathew
Assistant Engineers (Hr. Gr.)		Sri P. Karunakara Panicker
		,, J. Selvarose
Assistant Engineers		Sri C. Jose Mathew
		,, E. K. Gokulan
		,, R. Chithambaran Pillai
		,, P. M. James
		,, T. K. Sugathan
		,, A. J. Anto
		,, K. V. Ramanunni
		Smt K. S. Alphonse
		Sri T. M. Reghunath
		,, A. K. Unnikrishnan
		,, P. Raman
		,, M. Parameswaran
		,, T. S. Sukumaran
		,, P. R. Govindan
		,, C. L. Yacob
		Smt P. J. Sheela
		Sri Joseph K. Manavalan
Technician Sr. Grade	:	Sri T. A. Rappai

Draftsmen/Overseer Gr. I	:	Sri V. S. Balan
		,, C. C. Devassy
		,, S. Murukesan Assary
		,, V. Sankunny
		,, A. Usifin
		,, Savy Joseph
		Smt M. Vijayakumari
		Sri P. Raveendran Nair
		,, Pradeep, M. D.
		,, Suresh Babu, K.
		,, M. V. Chackochan
		,, T. K. Abdul Khadhar
		,, P. M. Vasudevan
		,, P. M. Mohammed Ismail
		,, K. T. Vasudevan
		,, R. Kumaran Nair
		,, A. P. Jose
		,, C. V. Babu
Senior Grade Assistants	:	Sri P. V. Sreekumaran
		,, K. Narayanan Namboodiri
		,, N. Rajasekharan
Assistant Grade II		Smt. R. S. Saroja
Assistants Grade I	:	Smt G. Rema Bai
		Sri Y. Rajas
		Smt B. Thankamany
		,, M. Rugmini
		,, A. T. Gracy
		,, L. Shyamala Devi
		,, P. V. Ramani
		,, A. A. Kousalya
		,, C. Santhakumari
Office Supdts		Smt M. I. Balamany
		Sri K. Muraleedharan
Senior Grade Typists	:	Smt P. P. Rosy
		Sri P. Nataraja Pillai
		Smt M. K. Jainuva
		,, K. Sathiavathy Bai
Road Roller Driver	:	Sri M. K. Bhaskaran
Technicians Grade I	:	Sri P. K. Vijayan
		,, T. S. Govindan
Drivers Grade II (LMV)	:	Sri K. M. Subramonian
		,, V. R. Chandran
		,, K. Vikraman Nair

Pump Operators Grade I	:	Sri V. B. Esaf
		,, K. K. Francis
		,, M. V. Parameswaran
		,, A. Narayanan
Pump Operators Grade II	:	Sri R. Kumaran Nair
		,, V. R. Parameswaran
		,, K. M. Baby
		,, T. P. Jose Mathew
		,, C. R. Kochu
Peons	:	Sri K. A. Sankaran
		,, V. L. Antony
		Smt K. Sarada
		Sri K. P. Kumaran
		,, K. A. Abdul Rasheed
Peon Hr. Gr.	:	Sri I. Nesan
Cleaner-cum-Conductor	:	Sri K. M. Haneefa
Watchmen	:	Sri V. A. Paily
		,, N. C. Murugan
		,, K. K. Balan
Assistant Lineman	:	Sri K. Ravi
Electrician Grade I	:	Sri C. A. Varghese
Transport Supervisor	:	Sri P. Abraham Daniel

Appendix IV

LIST OF STAFF IN THE VARIOUS CAMPUSES

COLLEGE OF AGRICULTURE, VELLAYANI

Dean	:	Dr N. Sadanandan
Department of Plant Breeding		
Professor & Head	:	Dr V. Gopinathan Nair
Professor	:	Sri K. Gopakumar
		Dr R. Gopimony
Assistant Professor	:	Sri S. G. Sreekumar
		Sri Swerup John
Department of Agricultural Botany		
Professor	:	Dr N. Krishnan Nair
		Sri P. D. Vijayagopal
Assistant Professor	:	Smt N. Kamalam
		,, D. Chandramony
		,, D. I. Suma Bai
Junior Assistant Professor	:	Sri D. Wilson
Department of Agronomy		
Professor	:	Dr V. K. Sasidhar
		Sri K. P. Madhavan Nair
		Sri V. Ramachandran Nair
		,, P. Chandrasekharan
		,, G. Raghavan Pillai
Associate Professor	:	Dr V. Muraleedharan Nair
Assistant Professor	:	Sri N. Prushothaman Nair
		Smt M. Meera Bai
Junior Assistant Professor	:	Smt S. Lakshmi
Department of Soil Science and Agricultural Chemistry		
Professor & Head	:	Dr R. S. Iyer
Professor	:	Dr Alice Abraham
		Dr S. Pushkala
Assistant Professor	:	Sri Harikrishnan Nair
		,, P. Rajendran
		,, C. Sundaresan Nair
		Smt P. Prabhakumari

Department of Entomology

Professor & Head	:	Dr N. Mohandas
Professor	:	Dr K. V. Mammen
		,, A. Visalakshi
		,, K. John Kurien
		,, George Koshy
		,, K. P. Vasudevan Nair
		Sri K. K. Ravindran Nair
Assistant Professor	:	Sri P. A. Rajan Asari
		Smt K. Santhakumari
		,, K. Saradamma
		Sri P. Reghunath
		Smt Suma Kuruvilla
		Dr P. B. Gopinath
		Dr S. D. Rita Kumari
		Sri C. Nandakumar
		Smt Naseema Beebi
Junior Assistant Professor	:	Smt Ambika Devi
		,, K. S. Prehila
		,, K. Sudharma
		,, Hebsy Bai
		,, R. Ushakumari

Department of Plant Pathology

Professor & Head	:	Dr K. I. Wilson
Professor	:	Dr M. C. Nair
		Dr S. Balakrishnan
Associate Professor	:	Dr Susamma Philip
		Dr S. K. Nair
		Smt G. Padmakumari
		Dr C. K. Peethambaran
Assistant Professor	:	Smt K. J. Alice
		Dr S. Bhavani Devi
		,, B. Rajagopalan
		Sri M. Abraham
		Sri B. Balakrishnan
Junior Assistant Professor	:	Sri M. Vijayan
		Smt V. K. Girija
		,, D. Geetha
		,, Kamala Nayar
		Sri C. Gokulapalan
		Kum Lulu Das

Department of Plant Physiology

Professor	:	Dr S. Seshadrinath
Associate Professor	:	Sri A. T. Abraham

Department of Agricultural Engineering

Professor	:	Dr A. N. Rema Devi

Department of Agricultural Economics

Associate Professor	:	Sri K. S. Karayalar
Assistant Professor	:	Sri E. K. Thomas
Junior Assistant Professor	:	Smt Elsamma Job
		,, S. Regeena

Department of Agricultural Extension

Professor	:	Dr A. M. Thampi
Associate Professors	:	Dr G. Balakrishna Pillai
		Dr B. Babu
Assistant Professors	:	Dr Muraleedhara Prasad
		Sri V. Padmanabhan
		Smt G. Sobhana

Department of Agricultural Statistics

Professor	:	Sri P. V. Prabhakaran
Assistant Professor	:	Sri P. Gangadharan (till 31-5-84)
Junior Assistant Professor	:	Sri M. Jacob Thomas (till 31-1-85)

Department of Horticulture

Professor	:	Dr S. Ramachandran Nair
Assistant Professor	:	Sri Vasanthakumar
Junior Assistant Professor	:	Smt V. L. Sheela

Department of Home Science

Associate Professor	:	Dr L. Prema
Assistant Professor		Smt Vimalakumari
Junior Assistant Professors		Smt V. Usha
		,, Mary Ukkru

Department of Animal Husbandry

Associate Professor	:	Dr Skariah Oommen

Instructional Farm, Vellayani

Associate Professor	:	Sri K. Pushpangadan
Assistant Professor	:	Smt M. Suharban
Junior Assistant Professor	:	Smt K. R. Sheela
		,, R. Devika

Administrative staff of the College of Agriculture

Administrative Officer	:	Sri V. Sreenivasan

Section Officers		Sri C. S. Ashok Kumar ,, D. Gilbert ,, K. Sreerangan ,, V. K. Balakrishnan ,, J. Kochukunju (upto 9-7-84) Smt Sreedhari Amma ,, R. Kamalabai (from 9-7-84)
Senior Office Supdts	:	Smt L. Lalitha ,, A. Lilly ,, T. Lakshmikutty Amma Sri L. Radhakrishnan Potti
Office Supdts	:	Smt Emiammal Sri M. R. Raveendran ,, A. William
Senior Grade Typists	:	Smt P. V. Enzitha Sri N. Haridas
Grade I Typists	:	Smt C. Padmavathi ,, S. Majida Beevi Sri A. Ramachandran Unnithan Smt P. Lalitha ,, B. Leela Bai Amma ,, C. Rajendran Nair ,, M. Ponmani Mohana ,, S. Radhamma ,, S. Vasundhara (w. e. f. 16-11-84) ,, P. Sarojini Ammal
Grade II Typist	:	Smt L. Sobhanakumari (from 25-3-85)
Senior Grade Assistants	:	Smt. J. R. Fatima Malar Sri M. N. Sasidharan ,, L. Wilson Smt G. Joice
Grade I Assistants	:	Sri K. Viswanathan Asari ,, N. K. Mohanakumar ,, B. Sukesan ,, T. Sasikumar Smt E. N. Savithry (from 25-5-84) Sri P. Gopinathan Nair Smt P. Lalithakumari Amma ,, B. C. Girija Devi Sri E. Shamsudeen ,, S. Reghupathy Chettiar Smt S. G. Kumari Girija

Gr. I Assistants	:	Sri N. Hrishikesan Nair
		Smt V. Leela
		,, P. Jameela (from 5-5-84)
		,, C. Chandrikakumari
		Sri P. R. MohanaChandran
		,, S. Viswakumaran Nair
		,, K. V. Purushothaman Nambia-thiri
		Smt Razia Beegum
		,, T. A. Mridula Kumari
		,, M. Padmakshy
		Sri S. Vallinayakom Pillai
Grade II Assistants	:	Smt N. Indira Devi
		,, Sherine V. Thomas (from 4-6-84)
		,, Indirakumari K. (from 20-8-84)

COLLEGE OF HORTICULTURE, VELLANIKKARA

Associate Dean	:	Dr P. K. Gopalakrishnan

Centre of Advanced Studies on Humid Tropical Tree crops & Environmental Horticulture

Director	:	Dr M. Aravindakshan (from 24-8-84)

Department of Pomology & Floriculture

Professor & Head	:	Dr M. Aravindakshan
Assistant Professors	:	Smt P. K. Valsalakumari
		Smt T. Valsamma Mathew

All India Co-ordinated Floriculture Improvement Project

Assistant Professors	:	Dr K. Gopikumar
Junior Assistant Professors	:	Smt K. B. Sheela
		,, Suma A.

Department of Plantation Crops & Spices

Professors	:	Dr S. Ramachandran Nair (1-4-84 to 17-4-84)
	:	Dr G. Sreekantan Nair (from 31-3-85)
Assistant Professors	:	Smt P. A. Nazeema
		Sri E. V. Nybe
		,, Joseph Philip (1-4-84 to 31-10-84)
Junior Assistant Professors	:	Smt T. Premlatha
		,, P. K. Sudha Devi
		Sri Sajan Kurien

Sub Centre for the Project for Research on Ginger

Assistant Professors	Sri Koshy Abraham
	Smt Maicykutty P. Mathew
	„ P. A Valsala
	Dr M S Rajeevan (from 12-3-85)

Scheme for PG Diploma in Natural Rubber Production

Assistant Professor	Sri K Rajmohan (from 24-4-84)

Manpower Development Scheme of Coffee Board

Professor	Dr G Sreekantan Nair (from 1-1-84 to 31-3-85)
Assistant Professor (Hort)	Sri T V Hybe (1-11-84 to 31-3-85)

Department of Olericulture

Professor & Head	Dr K V Peter
Assistant Professors	Sri T R Gopalakrishnan
	„ V K Raju
	„ S Rajan
	Smt Sabikutty Joseph
Junior Assistant Professor	Smt Baby Lissy Markose
	P Indira

Department of Agricultural Meteorology

Professor	Dr P Balasubramania Pillai
Assistant Professor	Sri A V R Keshava Rao
Res. Associate	Sri P Sreedharan Nair

Department of Processing Technology

Professor (holding addl. charge)	Dr K V Peter
Assistant Professors	Smt K A Girija
	Sri P Jacob John
Junior Assistant Professor	Smt V Indira

Department of Agronomy

Professor	:	Dr C Sreedharan
Associate Professor	:	Dr M Achuthan Nair
Assistant Professors	:	Dr P V Balachandran
		„ J Thomas
		„ B Mohan Kumar (upto 9-11-84)
		Smt V L Geetha Kumari
Junior Assistant Professor	:	Smt Mercy George

AICP for the Improvement of Tuber Crops (other than potato)

Assistant Professor (Agro)	:	Dr C. T. Abraham
Junior Assistant Professor	:	Smt E. K. Lalitha Bai

Department of Soil Science and Agricultural Chemistry

Professor (Project Co-ordinator, Soils)	:	Dr P. Padmaja
Associate Professors	:	Smt K. Leela
		,, G Droupathi Devi
		Dr A. K. Sharda
Assistant Professors	:	Smt K. C. Mary Kutty
		Sri Samuel Mathew
		Smt P. K. Sushama
		Dr Saleena Mathew

Coconut Root (wilt) disease Project (CRWDP)

Professor and Head of Dept. of Soil Sciences	:	Dr A. I. Jose
Associate Professor	:	Dr V. K. Venugopal
Junior Assistant Professor	:	Sri K. M. Sathianathan (1-4-84 to 27-7-84)

Department of Agricultural Botany

Professor	:	Dr K. M. Narayanan Namboodiri
Assistant Professors	:	Smt Achamma Oommen
		,, K. T. Prasanna Kumari
		Sri V. V. Radhakrishnan

Department of Agricultural Entomology

Associate Professor	:	Dr G. Madhavan Nair
Assistant Professors	:	Dr (Mrs) Sosamma Jacob
		Smt Pathummal Beevi S.

Scheme for investigating root (wilt) disease of coconut palms

Professor & Head of Department of Entomology	:	Dr T. S. Venkitesan
Assistant Professor (Nemat.)	:	Smt Susanamma Kurien

AICP on Biological control of crop pests & Diseases

Associate Professor	:	Dr P. J. Joy
Junior Assistant Professor	:	Sri N. V. Satheesan

Department of Plant Pathology

Professor and Head	:	Dr Abi Cheeran (from 24-11-84)
Professor	:	Dr. K. M. Rajan (1-4-84 to 23-11-84)
Associate Professor	:	Dr P. Varadarajan Nair
		Sri P. C. Jose
		,, A. Sukumara Varma
Assistant Professors	:	Dr Sally K. Mathew
		Sri Rajendran Pillai
Junior Assistant Professor	:	Smt Estelitta S.

Root (wilt) Scheme

Professors	: Dr K. I. Wilson	(upto 23-11-84)
	Dr K. M. Rajan	(from 23-11-84)
Junior Assistant Professors	: Sri T. Premanathan	
	Smt S. Beena	

KADP

Professor (Pepper)	: Dr Abi Cheeran	
Junior Assistant Professors	: Smt T. N. Vilasini	
	Sri M. Govindan	

Department of Agricultural Engineering

Professors	: Sri T. P. George	
	,, K. John Thomas	(from 30-10-84)
	Dr A. N. Rama Devi	(upto 30-10-84)
Assistant Professors	: Sri Jippu Jacob	
	,, M. Sivaswami	
	,, Sankara Narayanan	
Junior Assistant Professors	: Smt K. P. Visalakshi	
	Sri Kory Varghese	(from 15-5-84)

Department of Agricultural Economics

Professor	: Dr V. Radhakrishnan	
Associate Professor	: Dr K. Mohandas	
Asst. Professors	: Sri K. Ravi	
	,, K. J. Joseph	
Junior Assistant Professor	: Sri Selvin Jebaraj Norman	

Department of Agricultural Extension

Associate Professor	: Sri K. P. Ramachandran Nair	(from 8-8-84)

Department of Agricultural Statistics

Professor	: Sri P. V. Prabhakaran	(upto 31-5-84)
Associate Professor	: Sri V. K. Gopinathan Unnithan	
Assistant Professor	: Smt P. Soudamini	

KADP

Professor	(Coconut)	: Dr K. Kumaran
,,	(Cocoa)	: Dr R. Vikraman Nair
,,	(Cashew)	: Sri K. K. Vidyadharan
,,	(Pepper)	: Dr Abi Cheeran
,,	(Radio-Tracer)	: Dr P. A. Wahid
Associate Professor	(Safety officer)	: Smt N. V. Kamalam
,,	(Instrumentation)	: Sri K. Madhavan Nair

Assistant Professors	:	Sri Arthur Jacob
		,, A. Augustin
		,, P. C. Antony
		,, K. Rajamohan
		,, A. V. Mathew
Research Associate	:	Sri M. S. Hajilal

Department of Physical Education

Junior Assistant Professors	:	Smt Susy V. John
		Sri E. Soman

Technical Staff

Farm Supervisors	:	Smt P. K. Vijayalakshmi
		Sri P. C. John
		,, K. C. Kochumon
		Smt K. V. Eleyamma
		,, J. Vimala
Senior Grade Farm Assistants	:	Sri V. M. Mathew
		Smt M. K. Chandramathi
Ist Grade Farm Assistants	:	Smt N. J. Eleyamma
		Sri C. B. Sugathan
		,, N. M. Pavithran
		Smt M. G. Sujatha
		Sri K. S. Thankappan
		,, N. M. Mohanan
		,, V. Unnikrishnan
IInd Grade Farm Assistants	:	Smt Valsamma George
		Sri P. B. Bhashajan
		Smt R. Jayanthi
		Sri P. R. Sathian
Lab. Attenders	:	Sri M. C. Chandran
		,, Sri K. R. Prabhakaran
Lab. Assistants	:	Sri E. K. Chathu
		,, K. K. Chandran
		,, K. G. Krishnan
		,, P. Unnikrishnan
		,, T. R. Balakrishnan
		,, Basil Rodrigus
		,, V. Nandakumar
		,, K. M. George
Mali	:	Sri K. Krishnan Kutty
		,, Sri K. Sachinmayan
Processing Technical Assistant	:	Sri K. K. Kumaran
Technical Assistant	:	Sri M. Thankappan Nair

Technicians Grade II	:	Sri P. M. Ramesh Chandran
		,, T. R. Viswambharan
		,, T. V. Johny
		,, B. S. Suresh
Pump Operator	:	Sri E. Parameswaran Nair
Administrative Staff		
Administrative Officer	:	Sri P. K. Ramachandran Nair
Section Officers	:	Sri A. Appuchettiar
		,, Lourden Leord
		,, V. Venugopalan
Senior Grade Assistants	:	Sri K. N. Puspangadan
		Smt. K. K. Gauthami
		,, P. T. Thankamany
		Sri K. Balachandran
Ist Grade Assistants	:	Sri P. V. Sreedharan
		,, K. M. Mathew
		Smt C. C. Reddy
Assistants Gr. II	:	Smt K. S. Omana
		,, V. K. Santhakumari
		,, M. Girija
		,, K. V. Alamelu
		,, A. Sheela
		,, Baby Saroja
		,, C. K. Prabhavathy
		,, R. S. Saroja
		,, S. Valsala
Office Superintendent	:	Smt K. M. Mary
Typists	:	Smt C. J. Catherine
		,, K. Vimala
		,, M. L. Sosannam
		,, S. Greethabai
		,, L. Sobhanakumari (up to 23-3-85)
		Sri G. Hareendran
		,, V. M. Sulaiman
		Smt. P. Sarada
Hr. Grade Peon	:	Sri M. N. Sivaraman
Peons	:	Sri K. V. Ramachandran
		,, R. B. Ibrahim
		,, M. K. Muraleedharan
		Smt M. V. Kunjai
		,, M. V. Eliamma

Watchmen : Sri K. P. Ummer
,, P. I. Gulmuhammed
,, R. Gopalan Nair
(expired on 12-7-84).

College of Co-operation and Banking, Mannuthy

Professor (Co-operation) : Dr C. A. Jose
i/c of Assoc. Dean

Associate Professor (Economics) : Sri M. Mohandas

Associate Professor (Commerce) : Dr Sreekumaran Sreedharan

,, , : Dr N. Rajan Nair

Asst. Professor (,,) : Sri Philip Sabu

,, (Banking) : ,, James Manalel

,, (Co-operation) : ,, T. Paramjothi

,, (Economics) : Dr U. Ramachandran

,, : ,, Tharian George

,, : ,, K. A. Suresh

Junior Assistant Professor (Commerce) : Smt EVK Padmini

,, (provisional hand) : Miss Molly Joseph

COLLEGE OF VETERINARY AND ANIMAL SCIENCES

Dean : Dr M. Krishnan Nair

Professor (Res. Co-ordination) : Dr K. Radhakrishnan

Asst. Regr. (Tech.) : Dr T. R. Sankunny

Academic Staff

Department of Anatomy

Professor in charge : Dr P. A. Oommen

Associate Professor : Dr Lucy Paily

Asst. Professor : Dr K. Sreedharan Unni

Department of Animal Breeding & Genetics

Professor : Dr G. Mukundan

Associate Professors : Dr C. A. Rajagopala Raja

,, Sosamma Iype

Junior Assistant Professor : Dr C. R. Girija

Department of Animal Management

Professors : Dr T. G. Rajagopalan

,, C. K. Thomas

Associate Professor : Dr Kurien Thomas

Assistant Professors : Dr Francis Xavier

,, P. C. Saseendran

Department of Animal Reproduction

Professors	:	Dr C. P. Neelakanta Iyer
		,, K. Prabhakaran Nair
		,, V. Sudarsanan
Associate Professors	:	Dr E. Mathai
		,, M. S. Nair
		,, E. Madhavan
Assistant Professors	:	Dr T. Sreekumaran
		,, Joseph Mathew
Junior Assistant Professors	:	Dr K. Ramachandran
		,, K. V. Atman
		,, K. N. Aravinda Ghosh

Department of Clinical Medicine

Professor & Head	:	Dr K. M. Alikutty
Associate Professor	:	Dr N. M. Aleyas
Assistant Professor	:	Dr P. C. Alex
Junior Assistant Professors	:	Dr K. M. Jayakumar
		Dr P. G. Baby

Department of Dairy Science

Professor & Head	:	Dr M. Subrahmanyam
Associate Professors	:	,, Dr K. Pavithran
		,, M. V. Sukumaran
		,, N. Narayanan Nair
		,, R. Rajendrakumar
Assistant Professors	:	Dr M. Mukundan
		,, P. I. Geevarghese

Department of Extension

Professor & Head	:	Dr P. S. Pushkaran
Assistant Professor	:	Dr V. Raju
Junior Assistant Professors	:	Dr C. V. Andrews
		,, M. R. Subhadra

Department of Microbiology

Professor in charge	:	Dr S. Sulochana
Associate Professor	:	Dr K. T. Punnoose
Assistant Professors	:	Dr G. Krishnan Nair
		,, V. Jaya Prakash
Junior Assistant Professor	:	Dr D. Subharma

Department of Nutrition

Professor & Head	:	Dr E. Sivaraman

Associate Professors	:	Dr C. T. Thomas
		,, Maggie D. Menachery
		,, C. S. James
Assistant Professors	:	Dr T. V. Viswanathan
		,, M. Nandakumaran
		,, A. D. Mercy
Junior Assistant Professor	:	Dr P. Gangadevi

Department of Parasitology

Professor	:	Dr. K. Rajamohanan
Associate Professors	:	Dr. K. Chandrasekharan
		,, V. Sathianesan
		,, K. Madhavan Pillai
		,, C. George Varghese
Assistant Professors	:	Dr. C Pythal
		,, H. Subramaniam

Department of Pathology

Professor & Head	:	Dr A. Rajan
Professors	:	Dr. K. M. Ramachandran
		,, K. L. Mariyamma
Associate Professors	:	Dr. K. V. Valsala
		,, T. Sreekumaran
Junior Assistant Professors	:	Dr. N. Divakaran
		,, C. R. Lalithakunjamma
		,, C. B. Manomohan

Department of Pharmacology & Toxicology

Professor	:	Dr. M. K. Rajagopalan
Senior Scientist	:	Dr. Jacob V. Cheeran
Associate Professors	:	Dr. Zacharias Cheriyan
		,, P. Marykutty
Assistant Professors	:	Dr. N. Gopakumar
		Sri. V. R. Raghunandanan

Department of Physiology & Biochemistry

Professor	:	Dr. G. Nirmalan
Associate Professors	:	Dr. G. Venugopalan
		,, M. G. Ramakrishna Pillai
		,, K. P. Sadanandan
Assistant Professors	:	D. K. P. Surendranathan
		Sri. P. K. Ismail
Junior Assistant Professor	:	Dr. Sisiliamma George

Department of Poultry Science

Professor & Head	:	Dr A Ramakrishnan
Professors	:	Dr A K K Unni
		C K Venugopalan
Associate Professors	:	Dr G Raghunathan Nair
		R Sabarinathan Nair
Assistant Professors	:	Dr V K Elizabeth
		T V Viswanathan
		K Narayanankutty
		M R Rajan
		Smt Gopalakrishna Kurup
Junior Assistant Professors	:	Dr Peethambaran
		Leo Joseph

Department of Preventive Medicine

Professor	:	Dr E P Poly
Special Officer-Clinical & Internship	:	Dr P T Georgekutty
Associate Professor	:	Dr K Babu
Assistant Professor	:	Dr K Balagopal
		M R Sasidharanath
Jr Asst Professor	:	Dr M Abdul Azeez

Department of Surgery

Professor	:	Dr P C George
Associate Professors	:	Dr K N Muraleedharan Nair
		A M Jalaludin
		S Ravindran Nair
		C Abraham Varkey
Assistant Professors	:	Dr T Sarodamma
		K Rajankutty

Department of Veterinary Public Health

Professor	:	Dr R Padmanabha Iyer
Associate Professors	:	Dr M Soman
		P Prabhakaran
		E Nanu
Assistant Professor	:	Dr M T Jose

Department of Statistics

Professor & Head	:	Dr K C George
Assistant Professors	:	Sri K L Sunny
		N Ravindranath
Junior Assistant Professors	:	Smt V Narayanikutty
		K S Sujatha

Department of Animal Production Economics

Professor	:	Dr T. Prabhakaran

Physical Education

Junior Assistant Professors	:	Sri. O. K. Paul Smt. Molly Cherian
Administrative Officer	:	Sri. K. Balakrishnan Nair
Section Officers	:	Smt. V. R. Vijayamma Sri. K. Kuttappan Achary Smt. K. Rajamma ,, L. Syamala
Sr. Office Superintendent	:	Smt. D. Hymavathy
Lab Technicians	:	Sri. T. K. Poulose ,, C. Georgekutty
Research Assistants		Smt. Aniamma Chacko Sri. P. N. Vishnu Namboodiri Smt. Mariamma Kurien
Technician		Sri. C. Ramadasan
Sr. Gr. Assistants	:	Smt T. Ramadevi ,, Lillykutty Thomas ,, A. Subhalakshmi Ammal Sri. P. Aiyar Smt. A. K. Kamalabai ,, P. K. Beena
Gr. I Assistants		Smt. S. Rajalakshmi Amma ,, P. S. Himala ,, Shaly Mathew Sri. I. Somasundaram Smt. P. P. Ammamma Sri. Jacob Simon
Gr. II Assistants		Smt Mabel Philip Sri. K. J. Kuruvilla Smt Brigit Kuruvilla
Office Superintendents		Sri. K. G. Balakrishnan ,, T. D. Jose Smt Razia Beevi
Gr. I Typists		Smt P. K. Kalliani ,, K. Padmavathy Kumari B. Sathibhama
Gr. II Typist		Smt K. A. Geetha

Farm Supervisors	:	Smt P. V. Kunjar
		Sri C. Ramakrishnan
		Smt T. Kalliamkutty
		Sri M. K. Kumaran
		,, E. Sreedhara Marar
Farm Supervisors	:	Smt V. K. Radha
		Sri N. Bhaskara Pillai
		Sri T. K. Gopalan
		,, T. K. Abdul Rahiman
		,, O. Sreedharan
Farm Assistant (Senior Grade)	:	Sri A. S. Karunakaran
Grade I Farm Assistants (Dairy)	:	Sri K. L. Jose
		Sri C. C. Narayanan
		Smt P. C. Lilly
		,, P. C. Mary
		Sri P. S. Kumaran
		Smt P. Remani
		Sri J. K. Narayanan
		,, P. K. Vijayamani
		,, K. V. Balan
Technicians	:	Smt K. Indiradevi
		Sri P. M. Joseph
		,, Eapen G. Varghese
Reference Assistants	:	Smt K. S. Ambili
		Sri P. Sanjeev
		,, Abdul Razak
		,, T. A. Joseph
		Smt. B. Leela
Steward	:	Sri K. V. Suchindran
Matron	:	Smt T. P. Sudy
Syce	:	Sri V. L. Devassy
Clerical Assistants	:	Sri E. Gangadharan
		,, T. Narayana Menon
		,, N. Raghavan Achan
		,, K. K. Balakrishnan
		,, C. C. Pandit
		,, C. K. Karappan
		,, K. Gopalan
Peons	:	Sri K. Madhavan
		,, K. T. Devassy
		Smt V. Ammini Amma
		,, M. V. Ammini

	:	Smt P. L. Mariam
		.. K. A. Mathiri
		Sri K. V. Sukumaran
		.. I. Govindankutty
Duplicator Operators	:	Sri C. D. Jose
		.. M. Gopinathan
Technical Assistant	:	Smt K. P. Santhabai
Attendants	:	Sri M. Divakaran
		Smt M. R. Kathru
Sweeper-cum-Attendants	:	Sri K. A. Varghese
		Smt K. Saleena
Attendant	:	Smt K. O. Rosakutty
		.. T. J. Thanka
Sweeper-cum-Attendants	:	Sri V. V. Vasu
		Smt P. I. Kunjumol
		Sri P. K. Velayudhan
		.. A. Velayudhan
Sweepers	:	Smt A. N. Saraswathy
		Sri I. R. Rajan
Drivers		Sri M. Balakrishnan
		.. M. Sooryanarayanan
		.. C. L. Anthony
		.. A. J. Anthony
Cleaner-cum-Attendant	:	Sri E. L. Thimothy
Sweeper-cum-Attendant		Smt P. N. Santhakumari

COLLEGE OF FISHERIES, PANANGAD

Dean		Dr M. J. Sebastian
Professor (Aquaculture)		Dr D. M. Thampy
Professor (Fisheries Research)	:	Dr P. M. Mathew
Assoc. Professor (F. Biol)		Dr P. Ravindranath
.. (F. hydrography)		Sri K. K. Varma
.. (Fish processing)		Sri D. D. Namboodiri
.. (Fish. Tech.)		Sri P. Radhakrishnan
.. (Statistics)		Sri T. M. Sankaran
.. (Botany)		Sri K. M. George
Asst. Professor (Algology)		Dr Thresiamma James
.. (Acquaculture)		Sri C. G. Rajendran
.. (Fish breeding)		Sri Syed Ismail Koya
.. (Zoology)		Dr R. Shylajakumari
.. ..		.. J. M. Jose

Asst. Professor(Acquatic biology)	:	Dr C. T. Cherian
,, (Chemical Oceanography)	:	Sri P. S. Mrithunjayan
,, (Fish biochemistry)	:	Sri P. M. Sheriel
,, (Fish Microbiology	:	Dr M. C. George
Junior Assistant Professor (Genetics)		Kum. Elizabath Joseph
(Chthyology)		Dr B. Madhusoodhana Kurup
(Meteorology)		Sri N. N. Raman
(Nutrition)	:	Smt Lizy Bahanan
(Aquaculture)		Dr M. V. Mohan
		,, Anna Mercy
Research Fellows		Kum. Jessy D
		,, Susheela Mathew
		,, Vimala K
		,, S. Devika Rani
		,, K. M. Lathy
		,, V. Rekha
		Sri I. K. Venugopalan
		,, N. C. Pradeep
		,, K. A. Navas
		,, N. Ramadas
		,, K. C. Sajeevan
		,, R. P. Jayasankar
		,, H. V. Narayanan
Fieldman (Fisheries)	:	Sri V. K. Balakrishnan
		,, K. K. Raghu
		,, N. Chakrapani
Fisherman-cum-watchman	:	Sri M. S. Moni
		,, A. M. Kareem
		,, A. N. Raghu
		,, P. J. Kunjappan
		,, P. M. Gopi
		,, P. P. Pushpakaran
Farm Assistant Gr. II	:	Sri A. X. George
Administrative Officer	:	Sri K. G. Balakrishna Pillai
Section Officers	:	Sri A. Kuriakose
		Smt B. Lalitha Bai
Office Supdt.	:	Sri K. Paul Sextus
Sr. Gr. Typist	:	Smt R. Sarada Devi
Sr. Gr. Assistant	:	Smt M. S. Sulaika Beevi
Gr. I Assistants	:	Smt K. Muthumani
		Sri K. G. Antony

Gr. II Assistants	:	Smt K. A. Lucy Mary
		.. K. R. Santha
Gr. I Assistant	:	Sri P. U. Kesavan
Gr. II Assistants	:	Smt B. Bhanumathy
		Kum Prema B. Nair
		Sri P. T. George
Clerical Assistant	:	Smt T. N. Kausalya
Drivers (Gr II HD)	:	Sri I. T Rappai (from 30-10-84)
		.. P. K. Devassy
Drivers Gr. II (LD)		Sri A. P Chacko
		.. T. K. Ramanan
		.. K. Uthaman
		.. J. Joy
Bus attendant		Sri T. G. Radhakrishnan
Peons		Sri P. M. Varghese
		.. K. K. Raghavan
		.. Rajendra Babu Pilla
Class IV (Lib.) Peon		Sri K. N. Sasikumar
Sweeper-cum-attendant		Sri R. Gopal Singh
Part time sweepers		Smt E. Leelamony
		.. P. B. [illegible]

Instructional Farm & Fisheries Station, Puduveypu

Associate Professors	:	Dr. K. Jayaraja Vadhyar
		Sri K. S. Purushan
Assistant Professor (Brackishwater fish farming)		Dr. V. Jayaprakash
Assistant Professor (Aquaculture)		Sri M. M. Jose
Research Fellow		Sri K. S. Sajeevan
Grade II Assistant		Smt C. M. Girija

Institute of Agricultural Technology, Tavanur

Professor		Sri C. P. Muhammed
Asst. Professor (Hort)		Sri Philipose Joshua
.. (A. H.)		Sri H. Subramanian
.. (Agro)		Sri P. Ahamed
.. (Irri. Engg.)		Sri Jobi V. Paul
Junior Assistant Professor (Maths)		Smt V. P. Lakshmikutty
.. (Civil Engg)		Sri M. Venugopala Pillai
.. (Ele. Engg)		Sri G. Rajagopal
.. (Plant Path)		Smt T. J. Rehumath Niza
.. (Agro)		Smt P. V. Habeebur Rahman
.. (PP)		Sri M. A. Peter
.. (Hort)		Sri P. Rajendran

Research Assistant	:	Sri A. P. Gopalakrishnan

Regional Agricultural Research Station, Pilicode

Professor (holding full additional charge of Associate Director)	:	Dr R. R. Nair
Associate Professor (SS & AC)	:	Sri K. Babukutty
(Agron)	:	Sri I. P. Sreedharan Nambiar
(Chem)	:	Sri P. K. Narayanan Nambiar
(PP)	:	Sri P. K. Sathyarajan
		N. N. Ramankutty
(Agro)	:	Sri K. Sankara Pancker
(Plant Breeding)	:	Smt V. K. Mallika (on leave)
		Sri K. C. Chandy
(Stat)	:	Sri M. P. Abdu Razak
(Genetics)	:	Dr N. K. Vijayakumar
(Ent.)	:	Smt Soumyakala S. Nambiar
Junior Assistant Professor (Agrostology)	:	Dr K. Sudhakara
Asst. Professor (Hort)	:	Sri B. Jayaprakash Naik
(Meteo)	:	Dr G. S. L. H. V. Prasada Rao
		,, K. P. Mammootty
Research officer (Agro)	:	Sri P. K. Ramachandran Nambiar
(PP)	:	Sri T. C. Raghakrishnan
(Hort)	:	Sri L. Rajamony
(Ent)	:	Sri A. M. Ranjith
(Eco)	:	Smt C. Latha Bastian
(Agro)	:	Smt A. Nazeema
		Sri P. C. Balakrishnan
Junior Assistant Professors	:	Sri M. Govindan
		,, K. M. Abdul Khader
		,, A. Rajagopalan
Farm Assistants Gr. I	:	Sri Basil Rodrigues
		,, A. Vijayan
		,, K. J. Loveson
		,, P. N. Ratheesan
		,, K. A. Kurien
		,, M. M. Sankaran
		,, N. T. Satheesh Babu
Lab. Assts Gr. III	:	Sri V. Narayanan
		,, P. K. Narayanan
		,, K. M. George

Administrative Officer	:	Sri N. Padmanabhan Nair
Section Officer	:	Smt C. M. Radhakutty
Sr. Gr. Assistant	:	Sri P. M. F. Babu
Asst. Gr. I	:	Smt Suma Varghese
		,, S. Droupathy
		,, M. Leela
		,, C. Shobhanakumari
		,, T. Lakshmikutty
Typist Gr. I	:	Smt T. Radha.
Typists Gr. II	:	Smt V. P. Shyamala
		,, Lillykutty Sebastian
		Sri K. Ravindran
Farm Supervisor Gr. I	:	Sri R. Nelson
Tractor Driver Gr. II	:	Sri P. Sasidharan Nair
Drivers Gr. II	:	Sri A. V. Kunhikrishnan
		,, P. S. Vijayakumaran Nair
		,, T. M. Sukumaran
Oil Engine Driver	:	Sri P. K. Sadanandan
Higher Grade Peon	:	Sri P. Kannan
		,, P. Raghavan
Peon	:	Sri T. K. Chandran
		,, T. Raghavan
Sr. Gr. Farm Assistants	:	Sri P. S. Simon
		Smt K. Rugmini Amma
Watchman (Hr. Gr.)	:	Sri K. Koran

Pepper Research Station, Panniyur

Associate Professor (Ag. Chem.)	:	Sri V. Sukumara Pulai
,, (PP.)		Sri S. Sasikumaran
Assistant Professor (PP.)		Sri P. K. Unnikrishnan Nair
,, (Bot.)		Sri K. K. Ibrahim
Farm Supervisor		Smt M. J. Annakutty (upto 8-11-84)
Sr. Gr. Farm Assistants		Sri Basil Rodrigous (from 9-11-84)
		,, P. Raghavan
Grade I Farm Assistant	:	Sri P. J. Joseph
Field Supervisor	:	Sri K. Unnikrishnan Nair
Grade II Farm Assistants		Smt D. Prasannakumari
		Sri T. Mohammed Haneefa (upto 30-6-84)
		,, A. Ramakrishnan (from 7-8-84)
		,, Kunhimohammed
		,, L. Mohandas

Administrative Assistant	:	Smt K Pankajakshi
Grade I Assistant	:	Smt Mercy Sarojini
Grade II Typists	:	Sri N Prabhakaran (upto 7-7-84) Smt K Pushpavalli (from 9-7-84)
Hr Grade Peon	:	Sri K Chandran
Watchman	:	Sri M P Narayanan
Hr Grade Lab Assistant	:	Sri V Achuthan
Peon	:	Sri P Narayanan
Jeep Driver	:	Sri K Sreedharan

Regional Agricultural Research Station, Ambalavayal

Associate Director of Research	:	Sri K Kunhan
Associate Professor	:	Sri M Mohammed Hassan
Assistant Professors	:	Sri K C Appu Sri C M George Sri K P Mammootty Smt A Padmavathy Pillai
Junior Assistant Professors	:	Smt Susamma P George Sri C S Jayachandran Nair Sri V S Sreedhar Smt Jessy M Varghese Sri T P Ramachandran Smt Sosamma George
Farm Supervisor Grade I	:	Sri S M Jamaludeen (from 13-7-84)
Farm Supervisor Grade II	:	Smt K Parvathy
Farm Assistant Senior Grade	:	Sri K M Gopalakrishnan
Farm Assistants Grade I	:	Sri V K Kumaran Smt P Padmavathy
Farm Assistants Grade II	:	Sri C V Kuttappan K M George T K Omanakuttan M V Premarajan N R Rajan K Lakshmanan C T Jacob V P Ramakrishnan
Field Supervisor	:	Sri K Raghavan
Tractor Driver Grade II	:	Sri M Mohammedkutty
Oil Engine Driver	:	Sri A Varghese

Budder Hr. Grade	:	Sri K. Ramakrishnan
Lab. Assistants	:	Sri A. Govindan Nair ,, K. Achuthakurup
Lab. Assistant Grade III	:	Sri C. R. Balakrishnan
Administrative Officer	:	Sri N. Balakrishnan (from 11-6-84)
Section Officers	:	Sri V. Balagopalan ,, R. Rajendran Unnithan
Senior Grade Assistant	:	Sri E. George
Assistants Grade I	:	Sri K. Kelappan Smt P. Sulochana
Assistants Grade II	:	Sri T. K. Abdul Azeez ,, K. M. Abdul Nazar
Senior Grade Typist	:	Sri G. Shanmughan
Typist Grade II	:	Smt K. T. Vijayalakshmy
Jeep Driver Grade I	:	Sri M. Unnikutty
Driver LV Grade II	:	Sri T. L. Francis
Hr. Grade Peon	:	Sri K. Raman ,, K. Gopalan Nair ,, K. R. Chandrasekharan
Watchmen (Hr. Grade)	:	Sri T. Kunhappa ,, P. Moosa ,, K. Ibrahimkutty
Hostel Attendant		Sri K. Bapputy
Sweeper		Sri V. Ahkutty
Watchman Attendants		Sri P. Koya ,, M. C. Krishnan

Cashew Research Station, Anakkayam

Assoc. Professor (Agricultural Botany)	:	Dr M. N. C. Nair (till 11-6-84)
Assoc. Professor (Agricultural Botany)	:	Sri K. I. James (from 11-6-84)
Junior Assistant Professors	:	Smt P. V. Malini (up to 15-7-84) Smt K. Nandini (from 16-7-84)

Farm Assistants	:	Sri P. Bhaskaran (1-4-84—11-6-84)
		,, K. Aboobacker (from 12-6-84)
Assistants Grade I	:	Smt Sushamma (1-4-84 to 14-5-84)
		Sri C. Rajagopal (from 14-5-84)
Drivers	:	Sri C. C. Antony (1-4-84—10-5-84)
		,, Unnikrishnan (from 10-5-84)
Mali	:	Smt P. P. Ummachu
Peon	:	Sri C. Muhammed

Regional Agricultural Research Station, Pattambi

Associate Director	:	Sri N. Rajappan Nair
Professor (Soil Science)	:	Dr K. P. Rajaram
Assoc. Professor (Ag. Botany)	:	Dr K. Karunakaran
,, (Pl. Pathology)	:	Dr V. P. Sukumara Dev
,, (Ag. Chem)	:	Sri P. K. Gangadhara Menon
,, (Ag. Chem)	:	Smt N. P. Chinnamma
,, (Agron)	:	Sri D. Alexander
,, (Agron)	:	Sri M. Oommen
,, (Ag. Bot)	:	Smt P. Chandrika
,, (Agronomy)	:	Sri P. J. Tomy
Asst. Professor (Agron)	:	Sri K. Vasavambharan
,, ,,	:	Dr B. Mohankumar
,, ,,	:	Dr Kamalam Joseph
,, ,,	:	Sri P. H. Latif
,, ,,	:	Smt Savithri
,, (Ento)	:	Sri Baby P. Skariah
,, (Bio-chemistry)	:	Dr Jacob John
,, (Ag. Extn)	:	Sri S. Mothilal Nehru
,, (Hort)	:	Smt K. K. Santha
,, (PP)	:	Dr A. Sreedharan
Junior Asst. Professor		
(Ag. Econ)	:	Smt Jessy Thomas
,, ,,	:	Smt C. A. Mary
,, (PB)	:	Smt C. A. Rosamma
,, (Agro)	:	Sri P. P. Joy
Farm Supervisor (Vety) Hr. Gr.	:	Sri K. Achuthan
Farm Supervisors (Agri) Gr. II	:	Sri K. P. Kesava Menon
		Smt P. T. Sarada
		Sri Abraham K. Cheru
Farm Assts. Sr. Gr.	:	Sri N. S. Gertrude
		,, V. Kunchu
		Smt R. V. Balamani
		Sri P. Bhaskaran

Farm Asst. Gr. I (Vetyi	:	Sri C Ramachandran
,, (Agri)	:	Sri T. R. Sudevan (16-8-84 to 31-3-85)
		Smt E. L. Riechal
		Sri C. P. M. A. Azeez
Farm Assts Gr II	:	Sri C. B. Venugopalan (8-11-84 to 31-3-85)
		,, M. Saifudeen (9-11-84 to 31-3-85)
		,, P. C. Girijavallabhan
		,, M. J. Joseph
		,, T. Velayudhan
Farm Assts. Gr. II	:	Sri K. Justin (9-11-84 to 31-3-85)
		,, C. Gireesan (21-2-85 to 31-3-85)
		,, Sreenivasan Palasseri
		,, A. Abdul Rahiman
		,, M. V. Yusuf (22-2-85 to 31-3-85)
		,, E. R. Soman
		,, P. K. Kumaran (9-11-84 to 31-3-85)
		,, M. C. Sachidanandan (7-11-84 to 31-3-85)
		,, P. A. Moni (16-11-84 to 31-3-85)
Administrative Officer	:	Sri T. P. Ponnan
Section Officers	:	Sri N. Soman
		,, K. K. Parameswaran (1-9-84 to 6-2-85)
		,, K. P. Koyamu (1-2-85 to 31-3-15)
Senior Office Supdt	:	Sri K. Mammoo
Office Supdt. (Fc & D)	:	Sri M. P. Ramankutty Nair
Senior Grade Assistants	:	Sri K Rangaswamy
		,, M. P. Ahammed
		,, P. M. Cherukutty
		Smt K. Parukutty
Assistants Grade I	:	Smt P. Meenakshykutty
		Sri M. G. Rajendrababu
		Smt N. V. Thankamany
		Sri E. V. Sasidharan
Assistant Grade II	:	Sri O. Sethumadhavankutty

Senior Grade Typist	:	Sri P. Haridasan
Typist Grade II	:	Smt P. Vasanthakumari (23-1-85 to 31-3-85)
Duplicator Operator	:	Sri A. Jayagovindan
Electrician	:	Sri C A Varghese
Technician	:	Sri E Abdul Hakkim
Drivers	:	Sri K M Ayyappan
		,, M V Ramachandran
		,, M V Arumughan (21-2-85 to 31-3-85)
Lab Assistant Grade II & III		Sri T Gangadharan
Clerical Assistants		,, M P Sankaran
		Smt P Santhakumari
		Sri K R Ganesh
		,, V P Balasubramanian
		,, M Vasu
		,, V Bhaskaran
Head Peons	:	Sri T C Kandan
		,, Pundrathodi Narayanan
		,, A Cherny (1-8-84 to 31-3-85)
Peons (Higher Grade)	:	Sri K. Vasu
		,, A. Mammoo
		,, K P Narayanan
		,, Raman

Banana Research Station, Kannara

Associate Professor (Ag. Bot.)	:	Sri P. A. Varkey (up to 3-12-84)
Associate Professor	:	Dr K. Pushkaran (from 4-12-84)
Assistant Professors	:	Sri K. P. Rajeevan
		,, B. R. Reghunath
		Smt S Prasannakumari Amma
		,, Alice Kurien
		Sri Job Sathyakumar Charles
Junior Assistant Professors	:	Smt C. K. Geetha
		,, P. V. Nalini
		,, A. K. Baby Latha
Farm Supervisor (Agri)	:	Sri C. K. Vijayan
Farm Assistant Grade I (Agri)	:	Sri T. Ravindran

Farm Assistants Grade II	:	Sri P. R. Sathyan (upto 3-3-85) Smt R. Jayanthi (From 4-3-85) Sri P. K. Reghu ,, M. V. Sasidharan Nair ,, V. J. Paul
Oil Engine Driver	:	Sri K. A. Narayanan
Administrative Assistant	:	Sri K. Viswambharan
Clerk-Typist	:	Sri K. K. Parameswaran
Assistant Grade II	:	Sri U. P. Davis
Mali	:	Sri V. A. Ouseph ,, C. M. Prabhakaran
Watchman	:	Sri Beer Bahadur Singh
Peons	:	Smt K. Sosamma Sri T. Achuthan Nair

Cashew Research Station, Madakkathara (AICS & CIP)

Associate Professor (Agron.)	:	Sri P. G. Veeraraghavan
Assistant Professor (Ent.)	:	Sri C. Sitarama Rao
Junior Assistant Professor	:	Smt V. A. Celine

MSCRP

Professor (Hort.)	:	Sri S. Balakrishnan
Associate Professor (Ento.)	:	Dr Sushamma Mathai
Assistant Professor (Hort.)	:	Sri K. Aravindakshan
Farm Assistant	:	Sri Eswarachandran
Farm Assistant Grade I	:	Sri M. I. Kochuppan
Farm Assistant Grade II	:	Sri P. M. Jacby
Assistant Grade II	:	Sri C. Chandran
Typist Grade II	:	Smt P. Vilasini
Mali	:	Sri M. C. Krishnan
Driver (Grade II)	:	Sri P. I. Rappai

Pepper Research Scheme, Vellanikkara

Junior Assistant Professor	:	Sri N. Mohan Babu
Farm Assistants	:	Sri T. C. Sidharthan (upto 2-7-84) ,, K. S. Prasannakumar (from 23-8-84)
Assistant Grade II	:	Sri T. Premkumar
Peon	:	Smt I. Mariam
Watchman	:	Sri V. Alikutty (upto 13-6-84)

Agricultural Research Station, Mannuthy

Professor (Project Co-ordinator - Rice)	:	Sri T. F. Kuriakose
Assoc. Professor (Ag. Bot)	:	Sri P. A. Varkey (from 4-12-84)
Assoc. Professor (Agron)	:	Sri S. Janardhanan Pillai
" Professor (Bot)	:	Dr. K. Pushkaran (up to 3-12-84)
Asst. Professor (Agro)	:	Sri T. M. Kurien
Asst. Professor (Ag. Engg)	:	Sri V. Ganesan
Junior Assistant Professors	:	Sri Somasekharan Nair
		Smt Tessy Joseph
		" M. T. Kanakamani
		Sri Sunny K. Oommen
		" P. A. Joseph
		Smt K. P. Prasanna
Administrative Assistant	:	Sri P. Gopinathan
Senior Grade Assistant	:	Smt V. Vanaja
Typist Senior Grade	:	Smt P. Reetha Joseph
Assistant Grade I	:	Smt A. Santhakumari
		Sri K. G. Somanath
Jeep Driver	:	Sri N. K. Antony
Peons	:	Smt I. Parukutty
		Sri C. R. Velayudhan
Watchmen	:	Sri Manbahadur
		" P. V. Kumaran
Farm Supervisor Grade I	:	Sri V. Chakrapani
Farm Supervisors Grade II	:	Sri K. C. Achuthan
		" T. K. Mithran
		" P. G. Yamuna
Senior Grade Farm Assistants	:	Sri S. Krishnan Chettiar
		" M. P. George
Lab. Assistant Grade III (Senior)	:	Sri C. K. Dharmadas
Ist Grade Farm Assistants	:	Smt B. Radha
		Sri T. Gopalan
		Smt L. Radhammal
		Sri K. Vijayanarayanan
		Sri C. A. Mathew
Field Supervisor (from 8-5-84)	:	Sri T. Raman Nair
Mechanic/Tech. Grade III (from 7-12-84)	:	Sri K. O. Porinchu

Agronomic Research Station, Chalakudy

Professor (Agron)	: Dr G. Raveendranathan Pillai
Associate Professor (Soil Phy)	: Mrs G. Santhakumari
Asst. Professor (Agron)	: Sri Jose Mathew
" (Agron)	: Sri Kuruvilla Varghese
" (Ag. Chem)	: Sri C. S. Copi
Junior Assistant Professor	: Smt Sudharmai Devi C. R. (upto 22-10-84)
Farm Supervisor Grade I	: Sri K. K. Chandrasenan (upto 30-11-84)
Farm Assistants Grade I	: Sri E. N. Sudhakaran Nair (upto 30-6-84)
	" T. C. Sidharthan
Farm Assistants Grade II	: Sri P. N. Sadasivan (upto 7-7-84)
	" V. James
Lab. Assistant Grade III	: Sri T. K. Velayudhan
Farm Assistants Grade I	: Sri Unnikrishnan
	Haridas
	" P. V. Raghunath
Administrative Assistants	: Mr H. Salahudeen (upto 31-7-84)
	Smt V. M. Lalithakumari (from 23-8-84)
Assistants Grade I	: Smt K. Vinayabai
	" P. K. Elsy (upto 11-7-84
Assistant Grade II	: Smt S. Sathee Devi
Typist Grade II	: Smt P. K. Sara
Pump Operator	: Sri K. A. Subran
Jeep Driver	: Sri V. K. Karunakaran
Ploughman	: Sri K. C. Mathew
Peon	: Sri K. Radhakrishnan

Rice Research Station, Vyttila

Associate Professors	: Sri P. J. Tomy
	" T. U. George
	Dr Suseela Jose
Assistant Professor	: Smt P. Prabhakumari
Junior Assistant Professors	: Sri I. S. Bright Singh
	Smt Reena Grittle Pinhero

Farm Supervisor Grade-II	:	Sri S. M. Jainalabdeen (till 9-7-'84)
,, Grade-I		Sri P. Damodaran (from 9-7-'84)
		,, P M Poulose
Farm Assistants Grade I		Sri P A Moni (till 8-11-84)
		Smt P Jayamony (from 17-7-84)
Farm Assistants Grade II		Sri A A Abdulla
		Smt Padma Narayana Pillai (from 8 11 '84)
Lab Assistant		Sri P Madhavankutty
Administrative Assistant		Smt B Rugmini Amma (till 13-7-84)
		Sri M Abubakkerkhan (from13-7-84)
Assistants Grade I		Sri F M Vincent Pareira
		Smt T Vijayalekshmi
Typist Grade II		Smt Solomonlas
Drivers Grade II		Sri M I Joseph
		,, V K Lates
Fishermen		Sri K G Gopi
		,, N Vasu
Peons (Higher Grade)		Sri N S Raghunandanan
Watchmen		Sri B g Bahadur

Aromatic and Medicinal Plants Research Station, Odakkali

Professor (Agronomy)		Sri E V G Nair
Jr Assistant Professor		Sri K P Purushoth
		Smt K S Shylaja
Administrative Assistant	:	Sri K Ramankutty
Senior Grade Assistant	:	Smt P K Elsy (1-4-84 to 7-6-84)
		,, V K Padmini (1-4-84 to 26-9-84)
Assistant Grade-I	:	Smt Sophiamma Joseph (8-6-84 to 31-3-85)
Assistant Grade-II	:	Smt K P Premakumari (27-9-84 to 31-3-85)
Office Superintendent (FC & D)	:	Sri K K Ramachandran Nair
Peon	:	Sri M. M. Poulose
Watchman	:	Sri P. T Kalidasan
Sweeper-cum-Attendant	:	Sri K. B Sivarama Kurup
Permanent Labourers	:	Smt. K. A. Ponnamma
		Sri I. Veeran
Graduate Lab. Asstistant	:	Smt K. K. Santhakumari Amma
Lab Assistant Gr. I	:	Sri T. K. George

Boiler Attender	:	Sri K. Chellappa Mooppan
Farm Supervisor	:	Smt V. V. Mariamkutty
Farm Assistant Senior Grade	:	Smt K. Devaky (1-4-84 to 28-2-85)
Farm Assistant Grade I	:	Sri E. N. Sudhakaran Nair (9-7-84 to 31-3-85)
Farm Assistant Grade II	:	Sri C. I. Surendran (14-3-85 to 31-3-85)

Cardamom Research Station, Pampadumpara

Associate Professor (Plant Pathology)	:	Dr. P. Karunakaran
,, (Ento.)	:	Dr. K. Sasidharan Pillai
,, (Agro.)	:	Sri G. K. Balachandran Nair (Upto 23-5-84)
,, (Agro.)	:	Sri C. K. Prabhakaran Thambi (from 24-5-84)
,, (Bot.)	:	Sri K. Vasantha Kumar
Assistant Professor (Ag. Ext.)	:	Sri P. Vijaya Kumar
Junion Assistant Professor	:	Sri P. G. Sadankumar
Grade II Farm Supervisor	:	Sri L. Davy
Grade I Farm Assistants	:	Sri A. N. Parameswaran (26-6-84 to 26-12-84)
		Smt K. Devaky (from 8-3-85)
		Sri V. P. Prasad
Grade II Farm Assistants	:	Sri K. K. Vijayakumar
		,, Abdul Salam
Grade II Lab Assistant	:	Sri P. V. Joseph
Administrative Assistant	:	Sri L. Wilson (from 23-5-84)
Grade II Assistants	:	Sri A. Shahuddeen
		,, M. P. Vijayachandra Babu
Jeep Driver	:	Sri K. Chacko
Peon (Higher Grade)	:	Sri K. N. Sankara Pillai
Watchmen	:	Sri K. N. Raghavan
		,, K. Raghavan Pillai
		,, K. V. Thankappan
		,, K. K. Ramakrishnan

Regional Agricultural Research Station, Kumarakom

Professor (Agronomy)	:	Sri U. Mohammed Kunju
Associate Professor (Ento.)	:	,, D. Joseph
,, (Plant Pathology)	:	,, G. Indrasenan
,, (,,)	:	Dr. James Mathew
,, (Extn.)	:	,, B. Babu
,, (Fisheries)	:	Sri K. S. Purushan
,, (Econo.)	:	,, E. K. Narayanan Nair

Assistant Professor (Agri.)	:	Sri P. K. Gopi
(Bot.)		Smt P. Meera Bai
(Plant Bio.)		Sri P. K. Hari
(Ento.)		Dr. M. Prabhu
(Mycol.)		Dr. Jose Pereira
(Agril. Chem.)		Smt Sreekumari Chellappan
(Fisheries)		Dr. P. P. Abdul Azeez
(Wood Sci.)		Sri Ramakrishna Kanjilaya
(Agril. Engg.)		Dr. P. Bhaskaran
(Hort.)		Smt. Lissy Mathew
(Soils)		Dr. Kurian George
(Plant Bio.)		Smt. K. Mallika
(Pl. Physiol.)		Smt. Geetha P. Menon
Junior Assistant Professor	:	Smt. Leena Mathew
(Fisheries)		Dr. K. G. Padmakumar
		Dr. T. Balasubramanian
Administration Officer	:	Sri Philip K. Kurian
Office Supdt. (FC & D)	:	Sri K. V. Kurian
Office Supdts.	:	Smt M. I. Balamani (upto 4-8-84)
		Sri K. K. Gopakumaran Nair (14-8-84)
Section Officers	:	Smt. Maryamma Eapen (upto 19-7-84)
		Sri P. R. Sasidharan Pillai (26-7-84 to 1-8-84)
		Dr. H. Salahudeen (9-8-84 to 31-3-85)
Grade I Assistants	:	Sri M. P. Govinda Pillai
		Dr. M. R. Ramachandran Nair
		Dr. P. G. Sreekantha Pai
Grade I Assistant	:	Smt M. N. Radhamma
Grade I Typists	:	Sri M. C. Jayakumar
		Smt T. K. Ponnamma
		Dr. S. Vasundhara
		Dr. B. Leelabai Amma
		Dr. K. C. Mohan Kumar
Grade I Farm Assistants (Agri.)	:	Sri K. N. Rajendran (upto 28-2-85)
		Dr. M. Sukumaran Nair (upto 10-6-84)
		Dr. M. Kamarudeen (upto 18-6-84)

Grade I Farm Assistants	:	Smt N. Kamalamma (from 11-6-84) Sri K. Sashidharan (from 18-6-84) ,, K O. Shahul Hameed (1-3-85 to 31-3-85)
Grade I Farm Supervisor	:	Sri M. N. Narayana Pillai
Grade II Farm Assistants	:	Sri K. C. Varghese ,, M. K Vijayan (upto 8-8-84) ,, T. J. Mathew (from 9-8-84)
Grade II Farm Assistant (Vety.)	:	Sri M Sukumaran
Grade III Lab Assistants	:	Sri N. Prakasan ,, V. K. Vasu Smt P. S. Rathnam ,, K. V. Rukiya (upto 17-12-84) Sri J. Thankan (upto 31-1-85)
Artist		Sri P. K. Surendran
Grade II (LD.) Driver	:	Sri P. C. Kurian ,, T. K. Remanan ,, V. Uthaman ,, T. M. Francis
Driver (HD.)		Sri P. C. Kurian
Peon (Higher Grade)		Sri A. A. Pankajakshan ,, N. Purandaran
Peon (Higher Grade)		Sri T. K. Sreedharan
Watchman (Higher Grade)		Sri K. K. Thankappan ,, M. Easo
Watchman		Sri C. G. Mohanan
Fisherman		Sri P. Viswanathan
Sweeper cum Attendant		Smt A. P. Meenakshi

Rice Research Station, Moncompu

Professor (Plant Breeding)		Dr. C. A. Joseph
Associate Professor (Agron.)		Sri P. K. Chellappan Nair
Associate Professor (Agril. Extn.)		Sri B. Thomas
Associate Professor (Ag. Chem.)		Sri K. Chandrasekharan Nair
Associate Professor (P. P.)		Dr. I. Rema Devi
Associate Professor		Smt K. S. Rema Mony

Assistant Professors	:	Sri Madhusudhanan Nair
		Smt N. Rema Bai
		Sri Jan Heroor
		,, S. Hariharan
		Smt Radha Devi
		Sriram George
Junior Assistant Professors	:	Smt S. Leela Kumari
		Aman Pandit
		Sri elo Paul
		,, Prabhakaran Ammini
		Sri P. A. Nayar
Research fellows		
Technical staff		
Farm Supervisor Grade I	:	Sri P. Chellappan
Farm Supervisor Grade II		Smt N. Rajalekshmi
		,, G. Mohan
Senior Grade Farm Assistant		Sri Muthusubhan Pillai
Farm Assistant Grade II		Sri T. K. Vijayan
Field Supervisor		Sri V. Ramakrishnan
Lab. Assistant Grade II		Sri N. Sivadasan
Lab. Assistant Grade III		Sri P. Kunju Pillai
		,, K. K. Prabhakaran
Fishermen	:	Sri T. Venu
		,, V. Viswanathan
Administrative staff		
Administrative Assistant	:	Sri J. I. Walsalam (1-4-84 to 17-7-84)
		Smt Mary Amma Eapan (from 18-7-84)
Supporting staff		
First Grade Assistants	:	Smt B. Sarasamma
		,, D. Vijayamma
		Sri K. P. Rajan
		,, Mohammed Bashir
Grade II Assistant	:	Sri V. Govindarajan
Typist Grade I	:	Smt H. K. Khadeeja Beevi
Class IV-Peons	:	Sri P. K. Thankappan
		,, K. Sankaran
Sweeper-Cum-Attendant	:	Sri N. Viswanathan
Watchman	:	Sri K. P. Vidyadharan
Drivers	:	Sri M. D. Janardhanan
		,, M. P. Paul
Boat Helper	:	Sri K. Chandrasekharan Nair

Sugarcane Research Station, Thiruvalla

Associate Professors	:	Sri Sukumaran Nair
		Dr. N. N. Potty
Assistant Professor	:	Sri A. V. Mathew
Junior Assistant Professors	:	Smt K. Nandini
		,, Elizabeth K.
		,, Suman Susan Varghese
Sr Research Fellow		Sri Babu George
Technical staff		
Farm Supervisor		Sri A E Mendez
Grade I Farm Assistants		Smt S Nazeema
		Sri P V Reghunath (till 25-6-84)
		,, M Kamaruddin (from 26-6-84)
Administrative staff		
Senior Grade Assistants		Smt B Thankamony (till 31-7-84)
		Sri S. Govindan (8-8-84 to 31-8-84)
		,, M Abdul Salam
Grade II Assistant		Smt S Usha devi
Senior Grade Typist		Smt C B Merlin
Driver		Sri P Mohanan
Peon		Sri Bhaskaran
Watchman		Sri S Rajeev

AICRP on Agricultural Drainage - Regional Centre, Karumady

Assistant Professor (Ag Engg)		Sri S K Mathew
Agron		Sri U Jai Kumaran
Jr Asst Professor (Ag Engg)		Sri I D Raju
Senior Grade Farm Assistant		Sri A T Ayyappan Pillai
Grade II Farm Assistant		Sri P G Muraleedharan Pillai
		,, V I Rajendran
Typist		Sri P Vasudevan
Clerk		,, V Arumugam
Watcher		Sri P Sadasivan Pillai
Senior Grade Driver		Sri M Abdul Majeed
Driver		,, P Rajendran
Peon		,, T Kesavan

Rice Research Station, Kayamkulam

Assistant Professor (Soil Science)		Sri K Mohanan Pillai
Senior Grade Farm Assistant		
Grade II Farm Assistant		

Associate Professor (Ag. Bot.)	:	Smt. S. Santhakumari
(Bot.)	:	Dr. K. Sivan Pillai
Assistant Professor (Pl. Path.)	:	Sri M. G. Vasavan
Junior Assistant Professor (Nutrition)	:	Smt. P. Sushamakumari
(Extn.)	:	,, Lizzy Behanan
Farm Supervisor	:	Sri G. Surendran
Senior Grade Farm Assistant	:	Sri G. Raghavan Pillai
Farm Assistant Grade I	:	Sri Madhavan Pillai
	:	Sri M. Varghese (From 12-6-84)
	:	,, M. Ravindran Nair (upto 12-6-84)
	:	,, N. Vasudevan
	:	,, K. Satheesan
Farm Assistants Grade II	:	Sri G. Udayakumar (from 7-6-84)
	:	,, T. J. Mathew (upto 7-6-84)
Grade III Lab Assistant	:	Sri K. J. Joseph
Grade II Lab Assistants	:	Sri K. Chandrasekhara Pillai
	:	,, S. Kuttappan Nair (from 11-6-84)
Regular Mazdoors	:	Sri T. Balakrishnan
	:	,, V. Achuthan (upto 31-10-84)
Administrative Assistant	:	Sri T. V. Rajasekharan Nair (from 29-5-84)
Senior Grade Assistant	:	Sri K. P. Rajendra Prasad
Grade II Assistants	:	Sri K. Govindan
	:	Smt. B. Thankamani
Grade I Typist	:	Sri M. K. Muraleedhara Karanavar
Driver	:	Sri Sukumara Pillai
Higher Grade Watchman	:	Sri R. Kunjukrishnan
Watchman (Lower Grade)	:	Sri G. Sreedharan
Peon	:	Smt. Sosamma George
Part time Sweeper	:	,, N. Rajamma

NARP—Vellayani and Kottarakkara

Associate Director		:	Dr. N. Mohanakumaran
Associate Professor	(S. S.)	:	Sri P. R. Ramasubramonian
,,	(P. B.)	:	Dr. P. Manikantan Nair
,,	(Ag. Stat.)	:	,, P. Saraswathy
,,	(S. S.)	:	Sri P. Abdul Hameed
,,	(Hort.)	:	,, M. K. Mammen

Assistant Professor	(S. S.)	: Smt R. S. Shehana
,,	(Plant. Br.)	: ,, P. Manju
,,	(Nematology)	: ,, M. S. Sheela
,,	(Ag. Extn.)	: ,, S. Shylaja
,,	(Ag. Stat.)	: Sri R. Balakrishnan Asan
,,	(Hort.)	: Smt G. R. Sulekha
,,	(Agro.)	: ,, Annamma George
,,	,,	: ,, S. Sobhana
,,	(Ento.)	: Sri C. Nandakumar
,,	(P. P.)	: Smt K. K. Sulochana
Jr. Asst. Professor	(Economics)	: ,, A. M. Santha
Grade I (Agri) Farm Assistants		: Sri P. A. Sankutty
,,		: ,, V. D. Thulasidas
,,		: ,, M. K. Vijayan
		: ,, V. John George
		: ,, S. R. Rajeevan
		: ,, K. S. Ajayakumar
Grade I Lab Assistants		: Sri J. Dasayyan Nadar
		: Smt S. Saraswathy Amma
Photographer		: Sri M. S. Kuriakose
Duplicator Operator		: Sri C. Madhusoodan Nair
Administrative Officer		: Sri A. P. Lawrence
Grade I Assistant		: Smt V. Chandrika
Grade II Assistant		: Sri M. Abdul Nujum
Grade I Typists (Steno)		: Smt N. Dasamma
		,, P. Radha
		Sri S. Raghavan
		,, K. C. Mohankumar
		Smt S. Ramany
Driver Grade II		: Sri R. Soman Nair
,,		,, K. Sukumara Pillai

(on working arrangement)

Cropping Systems Research Centre, Karamana

Professor	: Dr E. Fajardin
Assistant Professors	: Sri S. M. Shahul Hameed
,,	,, Yageen Thomas
,,	,, Subramoniya Iyer
Junior Assistant Professors	: Sri Sam T. Kurutholtukal
,,	Smt P. B. Usha
,,	Sri S. Devanesan
,,	,, K. P. Jagan Mohan
Grade I Farm Assistant	: Sri D. Sulochanan
,,	,, A. Sashidharan
,,	,, Nesamony

Administrative Staff

Administrative Assistant — Sri P. K. Sasidharan Pillai
Grade I Assistant — Sri N. Parameswaran Nair
Grade I Typist — Smt B. Sukumari Amma
Peon — Sri P. K. Sukumaran Nair
Chowkidar — Sri R. Raghavan Pillai
Watchman — Sri P. Madhavan Nair
Attendant — Sri K. Pappachan
Part time Sweeper — Smt Bhanumathy

ECF at Quilon

Technical Staff

Associate Professor — Sri C. P. Balachandran Nair
Farm Assistants — Sri John David (from 15-6-84)
" George P. Purayath
" J. C. M. Das
" D. Jagadeesathan (from 12-6-84)
" G. Shaji (from 23-6-84)
" E. N. Ravindran Nair (from 6-7-84)
" S. Subramaran Nair (from 21-7-84)

Administrative Staff

Grade-II Assistant — Smt Sreelatha (from 9-8-84)
Jeep Driver — Sri K. Sukumara Pillai (from 18-7-84)
Watchman — Sri Narayana Pillai (from 16-6-84)

ECF at Pattambi

Technical Staff

Associate Professor — Sri M. R. C. Pillai (from 15-6-84)
Farm Assistants — Sri C. S. Joseph (from 11-6-84)
" A. Vijayan (from 20-6-84)
" G. K. Sukumaran (from 11-6-84)
" K. Mohammed Ali (from 5-7-84)
" T. Mohammed Haneefa (from 1-7-84)
" K. V. Natarajan (from 6-8-84)
" V. D. Thulasidas (from 16-8-84)
" T. P. Ali (from 9-11-84)

Administrative Staff

Grade-II Assistant : Smt S. Sushamma (from 1-8-84)
Jeep driver : Sri K. P. Pakkerkutty (from 11-6-84)
Watchman : Sri Kunhiraman (from 14-6-84)

Coconut Research Station, Balaramapuram

Associate Professor (Agro)	:	Sri K. Sivasankara Pillai
Assistant Professors	:	Smt R. Pushpakumari (from 16-4-84)
		,, P. Sukumari (from 7-5-84)
Technical Staff		
Grade-I Farm Supervisor	:	Sri C. Christudas
Senior Grade Farm Assistants	:	Smt J. Vimala (upto 20-7-84)
		,, H. Racheal (from 20-7-84)
Administrative Staff		
Administrative Assistant	:	Sri P. N. Ramachandra Kurup
Grade-I Assistant	:	Smt N. Sujatha
		,, J. Jeslet Mercy
Grade-II Typist	:	Sri K. Gopikuttan Nair
Higher Grade Peon	:	Sri P. Velappan Nair
Higher Grade Watchmen	:	Sri J. Vijayan
		,, G. Raghavan Pillai
Spl. Grade Mazdoor	:	Sri M. James

Livestock Research Station, Thiruvazhamkunnu

Scientists		
Associate Professor	:	Dr P. P. Balakrishnan
Assistant Professor	:	Dr P. Nandakumaran (25-7-84 to 31-1-85)
Junior Assistant Professor	:	Dr M. O. Kurien (1-4-84 to 18-11-84)
		,, Sakthikumar (18-11-84 to 18-12-84)
Para Technical staff		
Farm Supervisor (Agri.) Grade II		Sri K. Chellappan
(Vety.) Grade II		Sri K. Raman Menon
Farm Assistant (Agri.) Grade I		Sri M. Ummer
(Vety.) Grade I		Sri P. P. Narayana Panicker
(Agri.) Grade II		Sri V. M. George
		,, K. C. Sampurnan
		,, P. M. Joshy (1-4-84 to 27-6-84)
		,, B. Raghu (8-8-84 to 31-3-85)
		,, K. G. Mohandas (9-11-84 to 31-3-85)
(Vety.) Grade II		Sri O. K. Sukumaran
		,, C. Mohammed Usman (1-4-84 to 27-6-84 and 2-3-85 to 31-3-85)

Laboratory Assistant Grade II		Sri G Venu
Technician Grade II		Sri A Sankaran
Administrative Staff		
Administrative Assistants		Sri S Poornayyan (1-4-84 to 30-6-84)
		I N Sankunny
Assistants Grade I		Sri I Somasundaran (1-4-84 to 5-7-84)
		N U Jayarajan (6-7-84 to 31-3-85)
Assistants Grade II		Sri E C Jagirdar (1-4-84 to 16-6-84)
		S Prakash (1-4-84 to 12-3-85)
Typist Grade II		Sri M Mohandas
Supporting Staff		
Driver Grade II		Sri I Moidu
Mistry		Sri K Ramakrishnan
		,, K Krishnan
Peon Special Grade		Sri K Muhammed
Peon Higher Grade		Sri P Bharathan
Watchmen		Sri P Vasudevan
		,, C Chamu
		,, M Ramachandran
		,, A Chachunni
		,, C Kumaran
		,, V Ramachandran
		,, K Manukuttan
Field Supervisor	:	Sri C Sankaran Nair

AICRP on Poultry for Eggs, Mannuthy

Scientists

Senior Scientist (Professor)	:	Dr A Ramakrishnan
Assistant Professors	:	Dr T V Viswanathan
		,, P A Peethambaran
		,, Lalitha Kunjamma
		Smt Graceamma Kurien

		Dr M. R. Rajan (1-4-84 to 9-5-84)
		,, Leo Joseph (9-5-84 to 31-3-85)
Junior Assistant Professors	:	Dr Leo Joseph (1-4-84 to 9-5-84)
		,, M. O. Kurien (19-11-84 to 31-3-85)
		,, Mary K. Abraham (9-1-84 to 31-3-85)
Para Technical staff		
Farm Assistants (Vety.)	:	Sri M. K. Vijayakumar
		Smt K. G. Kamalamma
		Sri V. S. Bhaskaran
		,, K. R. Sivaraman
		,, M. G. Vasu
		,, C Ramachandran
Administrative staff		
Assistant Grade I	:	Sri V. S. Skandakumar
Assistant Grade II	:	Sri K. S. Paul
Typist Grade I	:	Smt P. K. Eswary
Supporting Staff		
Electrician	:	Sri E. T. Paul (6-8-84 to 31-3-85)
Driver	:	Sri Abdul Khadar (28-5-84 to 31-3-85)
Peon	:	Smt P. D. Annamma
Poultry Attendants	:	Smt K. Chandrika
		Sri C. R. Antony

AICRP on Agricultural by Products, Mannuthy

Scientists		
Professor	:	Dr P. Ramachandran
Assistant Professor	:	Dr George Mathen
Junior Assistant Professors	:	Dr Annamma Koruth
		Smt. Isha Chungath (1-4-84 to 5-12-84)
Para Technical staff		
Farm Assistants (Vety.)	:	Sri K. P. George (Sr)
		Smt M. C. Annu
		M. Lalithamma
Technician Grade III	:	Sri K. P. Sudarsanan Kumar

Administrative Staff

Assistants Grade II : Smt P Sreelatha (1-4-84 to 8-8-84)
Sri M N Chandrasekharan (17-8-84 to 31-3-85)

Supporting Staff

Livestock Attendants : Sri C Mohammadkutty (1-4-84 to 31-10-84)
T R Gopalakrishnan

AICRP on Goats for Milk, Mannuthy

Scientists

Professor (Genetics) : Dr B K Krishnan Nair
Professor (Nutrition) : Dr N Panigrahy
Assistant Professor (Pathology) : Dr C B Manomohan
.. (Animal Reproduction) : Dr J Vijayakumaran
.. (Animal Management) : Dr K C Raghavan
.. (Statistics) : Smt I K Indirabai
Junior Asst Professors : Dr P N Ananadaghosh
.. P Gangadevi

Para technical staff

Technical Assistant : Smt V M Sarada
Senior Computor : Sri K Krishnankutty
Laboratory Technicians : Smt A Leela
.. V Indira
Sri K Velayudhan

Administrative staff

Assistants Grade I : Smt M Baby
Sri M Abdul Samath
Smt P R Sreedevikutty
Assistant Grade II : Smt P Vijayalakshmi
Typist Grade II : Smt V R Chandrika (25-7-84 to 31-3-85)
Typist Grade II : Smt A Vasantha (1-4-84 to 23-3-85)

Supporting staff

Driver : Sri C T Louis
Class IV employees : Sri A G Rajendran
.. P U Karappan
.. K Sankaran Nair
.. V Ponnappan

University Pig Breeding Farm, Mannuthy

Scientist

Assistant Professor	:	Dr K S Sebastian

Para Technical Staff

Farm Supervisors (Veterinary) Grade II	:	Sri K M Neelakantan Kartha
		" E Sreedhara Marar (1-4-84 to 31-7-84)
		" K K Sasidharan Nair (1-8-84 to 31-3-85)

Administrative Staff

Administrative Assistant	:	Smt V V Radhamma
Assistant Grade I		" P P Annamma (1-4-84 to 23-7-84)
Assistant Grade II		Sri V V Kunjambu

Supporting Staff

Watchman	:	Sri T M Kesavan

Fodder Research and Development Scheme, Mannuthy

Scientists

Fodder Research Officers	:	Dr A M Chandrasekharan Nair (1-4-84 to 28-4-84)
		" V Prasad (28-4-84 to 31-3-85)
Jr. Assistant Professor		Smt K P Prameela (1-11-84 to 31-3-85)

Para Technical Staff

Farm Supervisor (Agri. Farm) II	:	Sri C V Thomas
Farm Supervisor (Vety.) Grade II		Sri P J Varghese
Farm Assistants (Agri.)		Sri K Kesavan
		Smt V Sarada (1-11-84 to 31-3-85)
Farm Assistants (Vety.)		Sri P A Francis (1-4-84 to 29-1-85)
		" A M Sreedharan (29-1-85 to 31-3-85)

Administrative Staff

Assistant Grade I	:	Smt V M Ammini
Typist Grade I		Smt K I Thanka
Lab Assistant Grade III		Sri K V Mohamed

Supporting Staff

Tractor Driver	:	Sri K K Padmanabhan
Watchman		Sri C Kunjuvar Nair

University Poultry Farm and Duck Farm Mannuthy

Scientists

Professor		Dr R Subramanian Nair
Assistant Professor		Dr V K Elizabeth
Para Technical Staff		
Farm Supervisor (Vety) Grade II		Sri O I Dominic
Farm Assistants (Vety)		Sri M Narayanankutty
		,, M V Chandran
		Smt P K Ammini
Administrative Staff		
Administrative Assistant		Sri P J Gopalakrishnan Nair (1-4-84 to 31-7-84)
		,, P K Nilakanta Pillai (1-8-84 to 31-3-85)
Assistant		Sri K Balakrishnan
Supporting Staff		
Poultry servant		Sri A Sreedharan
Peon		Sri M. Ayyappan

Veterinary Hospital, Kokkalai

Scientist

Professor	:	Dr K Ramadas
Assistant Professor	:	Dr K Rajankutty
Para technical staff		
Farm Supervisor (Vety) Higher Grade	:	Sri C K Lakshmanan
Farm Supervisor (Vety) Grade II	:	Sri M Chinnavan
Administrative staff		
Assistant Grade I	:	Sri K K Sadeesan
Supporting staff		
Attendants	:	Sri M K Shaik Abdul Rahiman
		,, K O Varghese
Permanent Servant	:	Sri N. K. Sankaran
Sweeper	:	Sri K N Saraswathy

Cattle Breeding Farm, Thumburmuzhi

Scientist

Assistant Professors	:	Dr V. Prasad (1-4-84 to 20-4-84)
		,, M. Mukundan (21-4-84 to 31-3-85)

Para Technical staff

Farm Supervisor (Vety.)	:	Sri P. P. Sankaran
Farm Supervisor (Agri)	:	Sri R. Chandran Pillai
Farm Assistant (Vety.) Grade I	:	Sri A. N. Sreedharan (1-4-84 to 22-1-85)
Farm Assistant (Vet.)	:	Sri V. Sukumaran Nair
Pharmacist	:	Sri C. K. Alias

Administrative Staff

Assistant Grade II	:	Sri K. K. Kuttappan

Supporting Staff

Pump Operator	:	Sri M. P. Joseph
Class IV employee (Special Grade)	:	Sri K. V. Bhaskaran
Herdsmen		Sri A. O. Thomas
		,, V. A. Kannan
		,, P. K. Velayudhan
		,, T. K. Thomas
		,, N. K. Ramakrishnan

Livestock Farm, Mannuthy

Associate Professor		Dr. P. A. Devassia
Junior Assistant Professors		Dr. Stephen Mathew (1-4-84 to 1-8-84)
		,, P. Kuttynarayanan (20-7-84 to 31-3-85)
		,, George T. Oommen (1-8-84 to 31-3-85)
Farm Supervisor (Vety.)		Sri C. P. Ramakrishnan
Farm Assistant (Vety.) Grade I		Sri P. P. George
Farm Assistants (Vety.) Grade II		Sri M. Sarvothaman
		,, T. Lakshmanan Potty
		,, P. V. Thomas
Administrative Assistant		Sri Paul Fernandez
Assistant Grade I		Sri M. Sreedharan
Assistant Grade II		Sri V. Chellappan (1-4-84 to 1-9-84)
		,, P. Vasu (1-9-84 to 31-3-85)
		P. Kunjulla (16-7-84 to 31-3-85)
Typist		Smt. S. Lalithambika Amma (1-4-84 to 5-6-84)

Pump Operator	Sri [illegible] Velayudhan
Permanent Servant Higher Grade	Sri M Krishnamkutty
Permanent Servants Grade II	Sri K P Jose Smt P [illegible] Leva

ICAR Adhoc Project on Nutrient Requirement of Caged layers

Assistant Professor	Dr [illegible] Andrews
Farm Assistant (Vety)	Sri C Mohammed Usman (w.e.f. 7-84 to 1-3-85)
	[illegible] (1-3-85 to 31-3-85)

Appendix V

LIST OF PUBLICATIONS

FACULTY OF AGRICULTURE

College of Agriculture, Vellayani

Manikantan Nair P, Mary K George and Gopinathan Nair V (1984) Estimation of variability and genetic parameters in chillies. *Indian Cocoa, Arecanut and Spices J.* 7 (4) 115-117

Pushkaran K and Gopinathan Nair V (1984) Groundnut varieties for summer rice fallows. *IRR Newsletter* 9 (6) 27

Gopimony R and Balakrishnan S (1984) Features of inter varietal hybrid of [illegible]. *South Indian Horticulture* 32 (3) 65-68

Sudhakrishnan [illegible] and Gopakumar K (1984) Correlation between yield and its components in tapioca. *Indian J Agric Sci* 54 (11) 973-975

Manikantan Nair P, Mary K George, Mohanakumaran N, Gopinathan Nair V and Saraswathy P (1984) Studies on correlation and path analysis in *Capsicum annuum L.* *South Ind Hort* 32 (4) 212-219

Nayar K [illegible] Biological control [illegible] Future Thrust. Paper presented in the National Seminar on Integrated Pest and disease management. Tamil Nadu Agricultural University, Coimbatore, Sept 1984

Nayar K [illegible] Future [illegible] plant disease control (Seminar on 2000 AD Kerala Agricultural University, Vellanikkara (1984)

Suseela [illegible] Pushpa [illegible] (1984) Studies on the microbial population of [illegible] Trivandrum district (Paper presented [illegible] symposium [illegible] soil and soil [illegible] held at Banaras Hindu University, Varanasi)

Suseela [illegible] Pushpa, Krishnan Nair M and Menon M R (1984) Biological assay of aflatoxin B [illegible] (Paper presented in the annual meeting of the Association of Microbiologists of India held at Pantnagar)

Suseela [illegible] Pushpa, Menon M R, Sreenivasa Murthy and [illegible] S C (1984) Screening of fungi for aflatoxin production in copra (Paper presented in the Annual meeting of the A M I held at Pantnagar)

Padmakumari G and Balakrishnan S Saprophytic survival of the rice sheath blight pathogen (Paper presented in the 37th Annual Meeting and symposium at Lucknow)

Vaskaran and Nair K Microbiology in 2000 AD (Paper presented in the Seminar at KAU 2000 AD)

Premkumari I and Padmadevi C K Evaluation of fungicides for the control of Phytophthora leaf spot of Ginger (Paper presented at the PLACROSYM VI at Kottayam)

Nair M C and Balakrishnan S Systems approach in Plant disease control (Paper presented in the seminar on KAU 2000 AD)

Abraham I Balakrishnan S Jayamadhavan K P A comparative study of the Rhizosphere microflora of the cultivated and the dihy coconut and arecanut palms of Kerala (Paper presented in the National symposium on soil pests and soil microbes held at KAU Vellanikkara)

Nair S K and Hunsigi G (1984) *A Text Book on Homology between Klebsiella pneumoniae* nif genes and *Azospirillum* DNA (Published as Advanced in Agricultural Biotechnology pp 1-62)

Susamma P George, Gopimony R and Gangadharan P (1984) Seedling progeny analysis in selected Cashew types *Agril. Research Journal of Kerala* Vol 22 (2)

Asan R B (1984) Estimation of parameters of truncated probability distribution An iterative procedure (Paper presented at the VI Annual Conference of the Indian Society for Theory of probability and its applications held on 27, 28 and 29 October 1984 at Trivandrum)

Asan R B and Prabhakaran T (1984) Probability model for calving intervals of cross-bred cows (Paper read at the VI Annual Conference of the Indian Society for Theory of probability and its applications held on 27, 28 and 29 December, 1984 at Trivandrum)

Asan R. B and Prabhakaran T. (1984) Correlation and path coefficient analysis of calving intervals of cross-bred cows *Kerala J Vet Sci.* 15:1-8.

Nair P. Manikantan, Mary K. George and Gopinathan Nair V (1984). Estimation of variability and genetic parameters in chillies *Indian Cocoa, Arecanut & Spices Journal*. 7 (4) 115-117

Nair P. Manikantan, Mary K George, Mohanakumaran N and Saraswathy P. (1984). Studies on correlation and path analysis in *Capsicum annum L. South Indian Hort.* 32 (4): 212-218.

Sudhadevi P. K., Mohanakumaran N. and Wahid P. A. (1985). Effect of NPK fertilization on the yield and quality constituents in *Costus speciosus* (Koening) Smith. (Paper presented at the V International Society of Horticultural Science Symposium on Medicinal aromatic and spice plants, Feb. 23–26, 1985 Mungpoo, Darjeeling, West Bengal).

COLLEGE OF HORTICULTURE, VELLANIKKARA

Balakrishna Pillai P (1984). Water requirement of rice crop at Pattambi. (Paper presented at the Symposium on water balance and national development, Andhra University, Visakapatanam.)

Balakrishna Pillai P, Usha K. E, Kesava Rao A. V. R. and Nair P. S. (1985). Influence of crop geometry on the growth and yield of rice. (International Symposium on concept and techniques of applied climatology-Andhra University, Waltair.)

Joseph P. A. and Balakrishna Pillai P. (1985). Effect of N, P and K on the growth and yield of chilli variety Pant C1. *Kerala Agri. Res. J.* (accepted) 1985.

Kesava Rao A. V. R. (1984). Delineating of climatic zones with reference to Agriculture in Karnataka. (Paper presented at the Water Balance and National Development, Andhra University, Vishakhapatanam.)

Kesava Rao A. V. R. and Balakrishna Pillai P. (1984). Agricultural drought studies in India. (A review. International Conference on Biometeorology, New Delhi.)

Kesava Rao A. V. R. and Balakrishna Pillai P. (1984). A method to determine water availability periods for optimization of crop growth. (International Conference on Biometeorology, New Delhi.)

Kesava Rao A. V. R. and Balakrishna Pillai P. (1985). A study of severe drought during 1982-83 in Pattambi. (International Symposium on Concepts and Techniques of Applied climatology, Andhra University, Waltair.)

Thomas J. and Rajendra Prasad. Effect of ionic form of mineral N in soil on rice nutrition. (Paper presented in the seminar on soil resources and productivity management. Golden Jubilee celebration of the Indian Society of Soil Science, IARI, New Delhi, 7-10 Dec. 1984.)

Aboobacker C. T. and Joseph K. P. 1984. Weed management in Sorghum-legume intercropping. *J. Agric. Sci. Camb.* 103, 103-115.

Balagopalan M. and Jose A. I. Distribution of organic carbon and forms of nitrogen in soil under rubber and teak. *Agric. Res. J. Kerala* 20 (2), 15-21.

Gopal Mathew and Koshy M. M. Effect of lime, Phosphorus and rhizobium inoculation on the growth and yield of cowpea. *Agric. Res. J. Kerala* 20 (2), 27-30.

Balagopalan M. and Jose A. I. Dynamics of organic carbon and different forms of nitrogen under first and second rotation teak plantations of Kerala. *Agric. Res. J. Kerala* 20 (2), 92-96.

Balagopalan M. and Jose A. I. Changes in organic carbon and different forms of nitrogen under first and second rotation (coppiced) Eucalyptus plantations. *Agric. Res. J. Kerala* 21 (1), 57-62.

Madhusoodhan Nair K. and Padmaja P. Phosphorus fixing capacity of major tea soils of Kerala. *Agric. Res. J. Kerala* 21 (1) 63-65

Usha P. B. and Jose A. I. Carbon nitrogen relationship in laterite soils of Kerala. *Agric. Res. J. Kerala* 21 (1) 15-22

Pathummal Beevi S. and Dale D. 1984. Stomach and Ovicidal actions of diflubenzuron on rice swarming caterpillar. Pesticides 1984 (XVIII) (6) 54-55

Jacob S. and Verma S. (1984). Persistence of Malathion on *Okra*. *Indian J. Agric. Sci.* 54 (11) 993-996.

Jacob S. and Verma S. (1984 a). Residues of Quinalphos *Okra* Proc. Pesticides and environment. Seminar held at TNAU Coimbatore 4-5th August 1983. 35-38.

Jacob S. and Verma S. (1984 b). Methomyl depletion residues on *Okra*. *Indian J. Ent.*

Lyla K. R., Joy P. J. and Abraham C. C. (1984). Population fluctuation of aphid pests of *Chromolaena odorata* in Kerala. *Agric. Res. J. Kerala* (In Press)

Lyla K. R., Joy P. J. and Abraham C. C. (1984). Studies on the insect pests of *Chromolaena odorata* in Kerala. Entomon (in press)

Joy P. J., Satheesan N. V. and Lyla K. R. (1985). Establishment of *Cyrtobagous salviniae* Sand. (Curculionidae: Coleoptera) on *Salvinia molesta* Mitchell in Kerala. *Agric. Res. J. Kerala* (in press).

Wilson K. I. (1984). Bunchy top disease of banana. Future Thrust—A review paper presented in National seminar on integrated pest and disease Management at TNAU, Coimbatore

Abicheeran and Sally K. Mathew (1984). Disease of pepper. Indian Cocoa Arecanut and Spices J. 7 (3) 73-76

Abicheeran and Sally K. Mathew (1984). Priorities and problems in the management of *Phytophthora* diseases of pepper, rubber and betel vine.

(A review paper presented in National seminar on Integrated Pest and Disease Management at TNAU, Coimbatore).

Rajan K. M., Jayaprakash M. G. (1984). Ecology of *Pseudomonas solanacearum*, the bacterial wilt pathogen in relation to the population of soil saprophytes.

(Presented in the National Symposium on Soil, Pest and Soil Organism held at Banaras Hindu University, Varanasi. Abstract presented in the proceedings of Indian Society of Soil Biology and Ecology-1984).

COLLEGE OF HORTICULTURE, VELLANIKKARA

Balakrishna Pillai P (1984). Water requirement of rice crop at Pattambi. (Paper presented at the Symposium on water balance and national development. Andhra University, Visakapatanam.)

Balakrishna Pillai P Usha K. E. Kesava Rao A. V. R. and Nair P. S. (1985). Influence of crop geometry on the growth and yield of rice. (International Symposium on concept and techniques of applied climatology-Andhra University, Waltair.)

Joseph P A and Balakrishna Pillai P (1985) Effect of N, P and K on the growth and yield of chilli variety Pant C1 *Kerala Agri. Res. J.* (accepted) 1985

Kesava Rao A V R (1984). Delineating of climatic zones with reference to Agriculture in Karnataka (Paper presented at the Water Balance and National Development, Andhra University, Vishakhapatanam.)

Kesava Rao A V R and Balakrishna Pillai P (1984). Agricultural drought studies in India (A review International Conference on Biometeorology New Delhi.)

Kesava Rao A V R and Balakrishna Pillai P (1984) A method to determine water availability periods for optimization of crop growth (International Conference on Biometeorology New Delhi.)

Kesava Rao A V R and Balakrishna Pillai P (1985) A study of severe drought during 1982-83 at Pattambi (International Symposium on concepts and Techniques of Applied climatology Andhra University, Waltair.)

Thomas J and Rajendra Prasad Effect of ionic form of mineral N in soil on rice nutrition (Paper presented in the seminar on soil resources and productivity management Golden Jubilee celebration of the Indian Society of soil Science IARI, New Delhi, 7-10 Dec 1984)

Abraham C T and Singh S P 1984 Weed management in Sorghum-legume intercropping *J. Agric. Sci. Camb.* 103 103-115

Balagopalan M and Jose A I Distribution of organic carbon and forms of nitrogen in soil under teakery and teak *Agric. Res. J. Kerala* 20 (2) 16-21

Samuel Mathew and Koshy M M Effect of lime Phosphorus and rhizobium inoculation on the growth and yield of cowpea *Agric. Res. J. Kerala* 20 (2) 27-30

Balagopalan M and Jose A I Dynamics of organic carbon and different forms of nitrogen under first and second rotation teak plantations of Kerala *Agric. Res. J. Kerala* 20 (2) 92-96

Balagopalan M and Jose A I Changes in organic carbon and different forms of nitrogen under first and second rotation (coppice) Eucalyptus plantations *Agric. Res. J. Kerala* 21 (1) 57-62

Muthusoudhan Nair K. and Padmaja P. Phosphorus fixing capacity of major rice soils of Kerala. *Agric. Res. J. Kerala* 21 (1) 63-65

Usha P. B. and Jose A. I. Carbon nitrogen relationship in laterite soils of Kerala. *Agric. Res. J. Kerala* 21 (1) 15-22

Pathummal Beevi S. and Dale D. 1984. Steriland and Ovicidal actions of diflubenzuron on the swarming caterpillar. Pesticides 1984 (XVIII) 10 54-55

Jacob S. and Verma S. (1984). Persistence of Malathion on *Okra*. *Indian J. Agric. Sci.* 54 (11) 914-916.

Jacob S. and Verma S. (1984 a). Residues of Quinalphos On Okra. Proc. Pesticides and environment. Seminar held at TNAU Coimbatore, 4 5th August 1983. 35-38.

Jacob S. and Verma S. (1984 b). Methomidophos residues on *Okra*. *Indian J. Ent.*

Lyla K. R., Joy P. J. and Abraham C. C. (1984). Population fluctuation of aphid pests of *Chromolaena odorata* in Kerala. *Agric. Res. J. Kerala* (In Press.)

Lyla K. R., Joy P. J. and Abraham C. C. (1984). Studies on the insect pests of *Chromolaena odorata* in Kerala. Entomon (in press)

Joy P. J., Satheesan N. V. and Lyla K. R. (1985). Establishment of *Cyrtobagous salviniae* Sand. (Curculionidae: Coleoptera) on *Salvinia molesta* Mitchell in Kerala. *Agric. Res. J. Kerala* (in press).

Wilson K. I. (1984). Bunchy top disease of banana - Future Thrust — A review paper presented in National seminar on integrated pest and disease Management at TNAU, Coimbatore

Abicheeran and Sally K. Mathew (1984). Disease of pepper. Indian Cocoa Arecanut and Spices J. 7 (3) 73-76

Abicheeran and Sally K. Mathew (1984). Priorities and problems in the management of *Phytophthora* diseases of pepper, rubber and betel vine.

(A review paper presented in National seminar on Integrated Pest and Disease Management at TNAU, Coimbatore)

Rajan K. M., Jayaprakash M. G. (1984). Ecology of *Pseudomonas solanacearum*, the bacterial wilt pathogen in relation to the population of soil saprophytes.

(Presented in the National Symposium on Soil, Pest and Soil Organism held at Banaras Hindu University, Varanasi. Abstract presented in the proceedings of Indian Society of Soil Biology and Ecology-1984).

Rajan K. M. and Singh R. S. (1984). Influence of soil saprophytes on the population dynamics of *Pythium aphanidermation* in soil. (Presented in the National Symposium on Soil Pest and Soil organism held at Banaras Hindu University, Varanasi. Abstract published in the proceedings of *Indian Society of Soil Biology and Ecology*-1984).

Babu George, Menon M. R. and Rajan K. M. (1984). Population dynamics of *Rhizoctonia solani* causing sheath blight of paddy under soil amendments

(Presented in the National Symposium on Soil, Pest and Soil organism held at Banaras Hindu University, Varanasi. Abstract published in the proceedings of Indian Society of Soil Biology and Ecology-1984).

Rajan K. M. and Sastry R. K. (1984). Priorities and problems in the management of important non-phytophthora diseases of few plantation crops

(Presented in the symposium held in concepts in integrated pest and disease management during the inauguration of centre for excellent in plant protection at Coimbatore)

Manomohan Das, T. P. and Abraham (1984). *Elettaria cardamomi*--A new host for *Phytophthora palmivora* (Butler) Butler.
(Presented in a symposium on plantation crop (PLACROSYM VI) at Rubber Research Institute, Kottayam)

Estella, S. and Abraham (1984). Microflora of stored black pepper
(Presented in a symposium on plantation crops (PLACROSYM VI) at Rubber Research Institute, Kottayam)

Premkumar, T. (1984). Evaluation of fungicides for the control of Phyllosticta leaf spot of pepper
(Paper presented at the Symposium on plantation crops (PLACROSYM VI) held at Kottayam)

Gopalan, M., Sastry, R. K. and Abraham Jos, E. (1984). Population dynamics of fungi in the rhizosphere of arecanut palm in some laterite soils
(A paper presented in symposium on plantation crops (PLACROSYM VI) at Rubber Research Institute, Kottayam)

Madhavan Nair, S. and Sivaraman, C. (1983). Control of *Helopeltis antonii* on cashew by new formulations of common insecticides. *Agric. Res. J. Kerala* 21 (1): (1983): 21-26. (Published 1984)

Madhavan Nair, S. and Sivaraman, C. (1983). Relative efficacy of some foliar insecticidal treatments for the control of *Helopeltis antonii*. *Agric. J. Kerala* 20 (2): 41-43 (Published 1982)

Abdul Khader Kapamony I and Balakrishnan P I (1984) Effect of raising cocoa as a mixed crop in adult coconut plantation (Presented in PLACROSYM VI Dec 17 20 1984 at Rubber Research Institute Kottayam)

Abdul Kader and Gopinathan Nair V (1984) Evaluation of the productivity of selected Sesamum genotypes *Agric Res J Kerala* (Accepted for publication)

Govindan M and Vikraman Nair R (1984) Association of the diazotroph *Azospirillum* in the root nodules of Cocoa (*Theobroma Cacao*) (Paper presented in PLACROSYM VI Dec 17 20 1984)

Govindan M, Sasmi P K and Vikraman Nair R (1984) Population dynamics of Meso organisms associated with Cocoa bean fermentation Paper presented PLACROSYM VI Dec 17 20 1984

Govindan M and Purushothaman D (1984) Occurrence of Nitrogen fixing bacteria, *Azospirillum* in certain plantation crops Abstract No 92 AMI 24th Annual meeting Pantnagar India

Prasada Rao G S L H V, Ravindran Nair R and Abdurazak (1984) Influence of weather on Coconut yield (Presented in PLACROSYM VI Dec 17 20)

Prasada Rao G S L H V and Ravikumar P J (1984) Flood occurrence and its impact on Rice Production in the low lying areas of Kerala (Presented in the Seminar on Hydrology with colloquium on precipitation analysis and flood forecasting)

Prasada Rao G S L H V (1984) Effect of weather on button shedding of coconut (Presented at the International Symposium on Concepts and Techniques of Applied Climatology, March 18–21, 1985 at Andhra University, Waltair)

Radhakrishnan T C and Jayaprakash Naik (1984) Varietal Reaction and loss of yield in Pepper due to fungal pollu under coconut shade. *Indian Cocoa, Arecanut and Spices Journal Vol. VI* No 4, pp 91-92.

Radhakrishnan T. C and Sathyarajan P K (1985) Control of Bud rot (caused by *Phytophthora palmivora*) of coconut using newer fungicides. Accepted for publication in pesticides

Radhakrishnan T. C and Sathyarajan P K (1984) Anthracnose of Elephant foot yam—a new record. Accepted for publication in the *Indian Journal* of *Mycology* and *Plant pathology*.

Sathyarajan P. K., Naseema A and Radhakrishnan T. C. (1985). Bacterial wilt of Sesame (*Sesamum indicum*. L)—A new record. *Curr. Sci.* Vol. 54, No. 6, pp 286.

Sathyarajan P. K. and Naseema A. (1985). *Piper longum. L.* a new host record for *Collectotrichum gloeosporioides* Penz. Accepted for publication in *Current Science*.

Naseema A., Balakrishnan S. and Nair M. C. (1983). Pathology and control of seed Mycoflora of some vegetables in Kerala. *Agric. Res. J. Kerala* 21 (2). 32-37.

Regional Agricultural Research Station, Kumarakom

Mary C. A. and James Mathew (1983). Chemical control of bacterial leaf blight of rice using antibiotics. *Agric. Res. J. Kerala* 21 (1): 17-20.

Koshy Abraham and James Mathew (1983). On the Physiological variation on *Xanthomonas campestris* p.v. betlicola Patel Kulkarni and Dhande Dge. *Agric. Res. J. Kerala* 21 (2) 1-6.

Joseph D. (1983). Effect of two synthetic pyrethroids insecticides on the control of cardamom thrips (*Sciothrips cardamomi* Rank) infesting cardamom. *Agric. Res. J. Kerala* 21 (2) 77-78.

Joseph D. (1983). On the control of cardamom Thrips *Sciothrips cardamomi* Ramk) with synthetic pyrethroids. *Agric. Res. J. Kerala* 21 (1) 77-80.

Mercy George and Muhammed Kunju U. (1983). Fodder Production potential of different maize-legume mixture under graded levels of nutrition. *Agric. Res. J. Kerala* 21 (1) 55-56 published in June 1985.

Mercy George and Muhammed Kunju U. (1984). Investigations on integrated control of root (wilt) disease of coconut—Paper presented to the XI Symposium on plantation crops held from 18-20 December 1983 at the RRII Kottayam.

Regional Agricultural Research Station, Ambalavayal

Devadas, S. Gopinathan, P. K. and Peter K. V. (1984). Breeding for resistance to fusarial wilt in vegetable Amaranthus. *Amaranthus News letter* (Proceedings of the Second Amaranthus Workshop, Washington).

Peter K. V. and Gopinathan P. K. (1984). Vellana cardamomum (Roxb.) Peter (Zingiberaceae), a new record from Kerala, India. *Taxon* (Boston) paper presented at the Botanical Congress, December (1984) at Berlin (West).

Regional Agricultural Research Station, Pattambi

[illegible] Effect of the level of salt stressed [illegible] Paper presented to the Annual Conference (1983) to be held [illegible].

[illegible] Control of [illegible] *Agric. Res. J. Kerala* 1983, 21 (1): 17-20.

Mathulal Nair S Progress of cow breeding at Livestock Farms of Trivandrum District. *Agric. Res. J. Kerala* 1982, 20 (1) 79-80

Sugarcane Research Station, Thiruvalla

Subramonian Nair S., Potty N. N., Varghese S. and Nair P. K. C. (1985). Effect of monsoon floods on the performance of some sugarcane cultivars in the alluvial soils of Kerala. *Ind. Sug.* Vol. 34 No. 10 [illegible]

Potty N. N., Subramonian Nair S. and Suseela Susan Varghese (1985). Effect of inundation on the growth and yield attributes of sugarcane cultivars. *Ind. Sug.* Vol. 34 No. 12

Neelakantan Potty, N., Subramonian Nair S., Suseela Susan Varghese and Nair P. K. C. Comparative performance of released sugarcane varieties in the alluvial soils of Kerala. (Accepted for publication by Indian Sugar Crops Journal)

Susan Suseela Varghese, Neelakantan Potty N., and Subramonian Nair S. Performance of different sugarcane genotypes in the Agroclimatic conditions of Kerala. (Accepted for publication by Indian Sugar)

Agricultural Research Station, Mannuthy

Pushkaran K. and Nair V. G. (1984). Rice based cropping systems—Groundnut varieties for summer rice fallows. *The International Rice Research Newsletter* 9 (6)

Pepper Research Station, Panniyur

Sukumara Pillai V. and Sasikumaran S. New concepts of crop management in pepper cultivation

Sukumara Pillai V. and Sasikumaran S. The slow wilt disease of pepper, a new outlook. *Indian Cocoa, Arecanut & Spices Journal* Vol. VII, January-March, 1984 No. 3

Aromatic & Medicinal Plant Research Station, Odakkali

Nair E. V. G. Progress of Research on Aromatic & Medicinal Plants. *Journal Anandavijatri January* 1985

Banana Research Station, Kannara

Charles J. S. K., Venkitesan T. S. and Yageen Thomas (1984). Comparative efficacy of antagonistic intercrops with carbofuran in the control of burrowing nemotodes *Radopholus similis* in the banana var. Nendran. *Indian J. Nematology.*

Kurien T. M., Prabhakaran P. V. and Varkey P. A. (1983). Path coefficient analysis in nendran variety of banana. *South Ind. Hort.*

Charles J. S. K., Venkitesan T. S., Yageen Thomas and Varkey P. A. (1984). Correlation of plant growth character components to bunch weight in banana infested with burrowing nematode *Radopholus similis* (Cobb). *Indian J. Nematology.*

Geetha C. K., Rajeevan P. K. and Rosamma C. A. (1984). Investigations of ratooning in banana. *Agric. Res. J. Kerala.*

Rajveen P. K., Indira V., Geetha C. K. and Varkey P. A. (1984). Evaluation of some culinary varieties of banana for Kerala. *Agric. Res. J. Kerala*

Rajeevan P. K. and Geetha C. K. (1984). Variability studies in the ratoon crop of banana. *South Ind. Hort.* 32 (4): 197—200.

Charles J. S. K., Abraham C. C., Joy P. J. and Varkey P. A. (1984) Unusual occurrence of *Cosmopolites sordidus* (Germeir) as an internal borer is banana peduncles. *Agric. Res. J. Kerala.*

AICRP on Agro-Forestry, Livestock Research Station, Thiruvazhamkunnu

Sasidharan N. K. (1984). Agro-forestry, a review—Technical bulletin published by the Directorate of Research, KAU, Vellanikkara.

Popular articles

Abraham C. C., 1983. On the control of major pests of cocoa. Arecanut Cocoa and Spices Journal October—December, 1983 (Published in 1984).

Abraham C. C., 1984. Step up cashewnut production by effective pest control. *Cashew Causerie*, April 1984 VI(1): 10—11.

Abraham C. C. et al. 1984. Control of rice field rats with traps. Ind. Farming, September 1984. 29—31.

Gangadharan P. [illegible]

Jalaja[illegible] Mathrubhumi Daily.

Baby Thomas and Jalaja[illegible]

Rajagopalan P. [illegible] Kerala Karshakan.

Rajagopalan P. and Pillai G. S. [illegible] Mathrubhumi

Rajan K. P. and Jalaja[illegible] Kerala Karshakan, July 16th 1984.

Rajan K. P. [illegible] Deshabhimani Daily dated 4.3.85.

Rajan K. P. [illegible] Mathrubhumi Daily dated 4.3.85.

Lakshmy S. (1984). Sahakari Research Analysis. Mathrubhumi Karshakan, Vol 20 (10): 5—6.

Gopinathan Nair V (1985) Research development and production of
annual oilseeds of Kerala an overview
Oilseeds production Oxford & IBH pub pp 19 to 30 375

Krishnan K and Gopinathan Nair V (1984)

Balakrishna Pillai P (1984) Needs for rural reconstruction Seminar
on Information Support for Rural Development Hyderabad

Balakrishna Pillai P (1984)
Express 7th April 84

Balakrishna Pillai P (1985) Magazine of
the Indian Agri Hort Society 1985

Balakrishna Pillai P (1985) Paper Presented at the Indian Agri
Hort Society (1985)

Rajan K M and Nair P V (1984) Diseases of Banana and their
control (Malayalam) in Daily newspaper The Malayala Manorama

Govindan M, Nair P V (1984)
12 (3) 26 29

Sankaranarayanan M R Mechanical device to collect Areca Payal
Malayala Manorama

(1984)
11 (1)

(1984)
12 (3) 681–685

(1984)
12 (3) 26–29

(1984)
12 (3) 17–19

(1984)

(1984)

(1984) 12

ചേരാസ് വി. എസ്. (1984) ഇഞ്ചി പുതയിടലും വളപ്രയോഗവും—ദീപിക ജൂലായ് 23.

ചേരാസ് വി. എസ്. (1984) പഴവർഗ്ഗങ്ങളിലും മലഞ്ചരക്ക് വിളകളിലും ഗവേഷണം—മാതൃഭൂമി, ജൂലായ് 30.

സൂസമ്മ ജോർജ് (1984) വളപ്രയോഗവും ചില തെറ്റിദ്ധാരണകളും—ദീപിക മേയ് 21.

സൂസമ്മ ജോർജ് പി. (1984). മധുരക്കിഴങ്ങ് അധികം വിളയാൻ—മലയാള മനോരമ, ആഗസ്റ്റ് 12.

[illegible] (1984) [illegible]—[illegible] [illegible]
[illegible]—[illegible] 12 (3)

Joseph P A (1984). [illegible] Veekshanam daily newspaper—1

Joseph P A (1984) [illegible] Veekshanam daily newspaper—2

Joseph P A (1984) [illegible] Veekshanam daily newspaper—3

Joseph P A (1984) [illegible] Veekshanam, daily newspaper—1

Joseph P A (1984) [illegible] Veekshanam daily newspaper—5

Joseph P A (1984) [illegible] Veekshanam, daily newspaper

Kanakamany V T and Prasanna K P (1984) [illegible] Express daily newspaper

Joseph P A (1984) [illegible] A fortnightly publication for KANFED—7

Joseph P A (1984) [illegible] Express daily newspaper

Joseph A A (1984) [illegible] Express daily newspaper

Joseph P A (1984) [illegible] Mathrubhumi daily newspaper

Joseph P A (1984) [illegible] Deepika daily newspaper

Joseph P A (1984) [illegible] Deepika daily newspaper

Joseph P A (1984) [illegible] Deepika daily newspaper

Joseph P A (1984) [illegible] Deepika daily newspaper

Joseph P A (1984) [illegible] Yuvadeepika

Joseph P A (1985) [illegible] Deepika daily newspaper

Joseph P A (1985) [illegible] Deepika

Joseph P A (1985) [illegible] Deepika daily newspaper

Joseph P A (1985) [illegible] Deepika daily newspaper

[illegible] Publication of KAU(FVAS) 1984

[illegible] Publication of KAU(FVAS) 1984

Mathirad Reimi S [illegible] suitable for dry season cultivation. Mathirabhumi daily

Pathrose P D and Joseph P A (1984) [illegible] Publication of Kerala Agricultural University

Joseph P A (1984) [illegible] Publication of KAU(FVAS)

Sasidharan N K (1984) Minimum tillage for rice fallows [illegible] The Hindu Daily, dated 5.9.84

FACULTY OF VETERINARY & ANIMAL SCIENCES

Scientific Articles

Girija C R and Nair K K K (1984) 'Lactation and peak yields in crossbred cows' *Kerala J. Vet. Sci.* 15 (1) 1-7

Nandakumaran B, Tandon S N and Khanna N D (1984) 'Studies on biochemical polymorphism in cross bred cattle in Andaman-calculation of Haryana crossbreds' *Kerala J. Vet. Sci.* 15 (1) 8-12

Sosamma Iype, Thomas P., Ella Luttuq and Baker H (1984) 'Factors influencing age at first calving of crossbred cows in Kerala' *Kerala J. Vet. Sci.* 15 (1) 25-28

Narayankutty U., George K C and Sosamma Iype (1984) 'General Selection index for the improvement of poultry' *Kerala J. Vet. Sci.* 15 (1) 13-24

Sosamma Iype, Girija C R and Mukundan G (1984) 'Factors to predict first lactation 305 days milk yield of cross-bred cattle in Kerala' *Proceedings of the Scientific Seminar at NDRI (SRS) Bangalore* on 22nd Sept., 1984.

Rajagopala Raja C. A. and Balakrishnan C R (1984) 'Changes in serum gammagloleutin level in cows around praturition time' *Proceedings of the scientific seminar at NDRI (SRS) Bangalore* on 22nd Sept. 1984.

Mukundan G and Sosamma Iype (1984) 'Cattle breeding strategy for Kerala--2000 AD' *Proceedings of the seminar KAU-2000 AD from 22nd-24th* Nov. 1984 at Vellanikkara

Mukundan G., Bhat P. N and Khan B. U. (1984) 'Factors affecting monthly body weight gains in Malabari goats and their Saanen half breds'. *Indian J. Anim. Sci.* 54 (8)

Rose J. and Sosamma Iype (1984). 'Inheritance of chick weight and egg production in white leghorns 1. Influence of non-genetic factors'. *Kerala J. Vet. Sci.* 15 (2) 15-20

Rose J., Sosamma Iype and Venugopalan C. K. (1984). 'Inheritance of chick weight and egg production in white leghorns II. Heritability estimates'. *Kerala J. Vet. Sci.* 15 (2) 21-28.

Girija C. R., Nair B. R. K. and Sosamma Iype (1984). 'Persistency index and lactation curve in cross bred cows'. *Kerala J. Vet. Sci.* 15 (2) 86-92.

Rose J., Sosamma Iype and Renchi P. George (1984). 'Relationship between chick weight and egg production in white leghorns'. *Kerala J. Vet. Sci.* 15 (2) 169-172.

Ravindran T. K., Venugopalan C. K. and Ramakrishnan A. (1984). A survey on the status of Duck Farming in Kerala State. *Indian J. Poult. Sci. Vol.* 19 (2) 77-80.

Andrews C. V., Venugopalan C. K., Unni A. K. K., and Ramakrishnan A. (1984). Comparative performance of Ducks reared under two systems of housing. *Kerala J. Vet. Sci. Vol.* 15 (2) 140-145.

Easwaran K. R., Ramakrishnan A., Venugopalan C. K. and Nair G. R. (1985). Comparative Performance of Khaki Campbell and Desi Ducks. 2. Egg Production, Feed Efficiency and Egg quality. *Indian J. Poult. Sci. Vol.* 20 (1) 42-45.

Chandramouli, V. R., Madhavan E. and Ravindranathan N. Factors affecting reproductive traits in cross-bred cows. *IJRS.* 1 66-69 1984.

Narayankutty, D. and George, P. C. Restricted Selection Indices in Poultry Breeding. *KJVS Vol.* 15, No. 2 Dec. 1984 p. 115-118.

Iype, Thomas, V. and Sureshan, P. V. Pattern of growth and an alternative approach to the comparison of rates of growth of domestic fowls and guinea fowls. *KJVS Vol.* 15, No. 1 June 84 p. 45-50.

Narayankutty, D., George, P. C. and Sosamma Iype. General Selection Indices for an Industrial Unit of Poultry. *KJVS Vol.* 15, No. 1 Jun 1984 P. 13-21.

Popular articles

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

COLLEGE OF FISHERIES

Hampy D M New horizons of aquaculture paper presented in the seminar on KAU 2000 AD held at Vellanikkara during November (1984)

Mathew P M Prospects of Brackish water Fish and Prawn Farming on the South West Coast of India (Workshop on problems of Transfer of Technology in Aquaculture National Institute of Rural Development Hyderabad November 1984)

Mathew P M Prospectives of Fisheries Research in Kerala Agri University Seminar on KAU 2000 AD November 1984

Rajendran C G (1984) Prawn production in Kerala Budding in Withering *Seafood Export Journal* Vol XVI No II Nov 84

Padmakumar K G Jayaprakash V Mathew A J and Mohammed Kunju In incidence of Fungal infection on the developing eggs of *Cyprinus carpio* Var communis and use of polythene threads as egg attachment device *Curr Sci* 1985, 54 (4) 195-196

Popular articles

Purushan K S (1984) 'Matsyakrishikku Vendee vigal' Malayala Manorama Daily dated 19th Aug 1984

Purushan K S (1984) 'Matsyakrishi koodutal pradanamakkan' Malayala Manorama Daily dated 3rd October 1984

Purushan K S (1984) 'Kulathile matsyakrishi sadhyam vardhippikkan' Malayala Manorama Daily dated 28th Nov 1984

Jayaprakash V (1984) 'Chakara' Kalpadhenu May 1984, 11 (4) (39-40)

Jayaprakash V. (1984) 'Kulathile Matsyakrishi' Kerala Karshakan, July, 1984. 29 (19): 28-29.

Jayaprakash V. (1985) 'Nellum Meenum onnichu valarthehi' Mathrubhumi Daily, Jan , page 4

Jayaprakash V. (1985). 'Chippy valarthal' Kalpadhenu, March 1985. 12 (3): 36-39.

COLLEGE OF CO-OPERATION & BANKING, MANNUTHY

Paranjothi T. (1984). Integration of the Co-operative Credit Structure *The Co-operator* No. 15, Vol. XXI

Mohandas M. (1984). Seventh Plan: Strategy for Local Level Planning. *The Economic Times*, August, 6.

Mohandas M. (1984). A note on the Impact of Human settlement on Forest Ecology in Wynad District in Kerala. Paper presented at the Seminar on *Eco-Development* of the *Western Ghats held* at KFRI, Peechi.

Mohandas M. (1984) A Swadeshi Economic System for India—A model of Integrated Approach. Paper presented at the Seminar on Integrated approach to our Economic and Social problems held at Trivandrum by the Bharateeya Vicharkendra.

Philip Sabu and Paranjothi T. (1985). Restrictive provisions in the Kerala Co-operative Societies Act, 1969. Paper presented at the National Programme on Co-operative Law as an instrument of Management held at Vaikunth Mehta National Institute of Co-operative Management, Pune

Appendix VI

PROJECT CO ORDINATION GROUPS

AGRICULTURE

Rice

Project Co-ordinator : Prof. I. F. Fernandez

Members : Prof. P. N. Pushkaraj, Dr. V. Gopinathan Nair,
Mr. N. Rajappan Nair, Dr. K. Karunakaran, Mr. K. I. James,
Mr. P. J. Tomy, Dr. V. K. Sasidhar, Mr. P. K. G. Menon,
Dr. R. S. Aiyer, Mr. N. N. Ramankutty, Dr. C. C. Abraham,
Dr. M. J. Thomas, Dr. B. C. Nair

Coconut, Arecanut & Oil Palm

Project Co-ordinator: Prof. K. Kannan

Members : Mr. B. Thomas, Mr. E. P. Koshy, Dr. P. K. Narayanan
Nambiar, Dr. C. Sreedharan, Dr. R. Vikraman Nair, Dr. A. I. Jose,
Dr. T. S. Venkitesan, Dr. M. C. Nair, Dr. K. M. Rajan

Spices

Project Co-ordinator: Dr. Abi Cheeran

Members : Officer i/c RARS Ambalavayal, Officer i/c FRS Panniyur;
Officer i/c CRS Pampadumpara, Mr. S. Sasikumaran,
Dr. T.S. Venkitesan, Mr. O. Joseph, Dr. K. Karunakaran,
Dr. A. I. Jose, Dr. C. C. Abraham, Dr. N. Mohanakumaran

Cocoa & other Beverage crops

Project Co-ordinator: Dr. R. Vikraman Nair

Members : Dr. K. Kumaran, Dr. C. K. Peethambaran, Dr. P. J. Joy,
Dr. N. Mohanakumaran, Dr. Abi Cheeran, Dr. P. C. S. Nair,
Dr. C. C. Abraham

Cashew

Project Co-ordinator: Prof. K. K. Vidyadharan

Members : Professor of Horticulture (Cashew),
Mr. P. G. Veeraraghavan, Dr. K. I. James, Dr. C. C. Abraham,
Dr. Abi Cheeran, Dr. M. Aravindakshan

Fruit Crops & Floriculture

Project Co-ordinator: Dr M. Aravindakshan

Members : Professor K. Kannan, Mr P. C. Jose, Professor of Horticulture, (College of Agriculture, Vellayani), Officer i/c. BRS Kannara, Officer i/c RARS Ambalavayal, Officer i/c. AICRP on Floriculture, College of Horticulture, Dr G Madhavan Nair

Vegetables & Tuber Crops

Project Co-ordinator Dr K. V. Peter

Members : Professor of Horticulture, College of Agriculture, Vellayani, Dr N Mohanakumaran, Dr T. S. Venkitesan, Dr C Sreedharan, Dr K. I. Wilson, Dr G Madhavan Nair, Asst. Professor i/c AICRP on Tuber Crops, College of Horticulture, Scientist i/c AICVIP College of Horticulture

Pulses & Oil Seeds

Project Co-ordinator Dr V Gopinathan Nair

Members : Dr N Krishnan Nair, Smt S. Santhakumari, Assistant Professor AICRP on Pulses Research, RARS Pattambi, Professor T. E. Kuriakose, Mr M. R. C. Pillai, Dr R. S. Aiyer, Dr V. K. Sasidhar, Dr P. J. Joy, Dr Abi Cheeran, Dr S. K. Nair

Essential Oils & Medicinal Plants

Project Co-ordinator Mr E. V. G. Nair

Members : Dr A. I. Jose, Dr. C. C. Abraham, Dr M. K. Rajagopalan, Dr P. Varatharajan Nair, Officer i/c. RARS Ambalavayal, Mr Joseph Philip, Dr G. Sreekantan Nair

Post Harvest Technology & Nutrition

Project Co-ordinator Professor K. K. Vidyadharan

Members : Mr [illegible] C. Babu, Dr K. V. Mammen, Mr Jacob John, Dr K. J. Peter, Mr [illegible] Sukumaran Dev, Dr Suramma Philip, Dr [illegible], Dr [illegible], Associate Professor AICRP on Agril By-products, College of Dairy and Agri Sciences, Mannuthy

Sugarcane & Miscellaneous Crops

Project Co-ordinator Dr P. M. [illegible] Namboodiri

Members : Prof. A. I. [illegible], Dr R. Vikraman Nair, Mr S. Sukumaran Nair, Mr [illegible] Raveendran Nair, Mr P. K. Chellappan Gopi, Dr M. C. Nair, Mr A. V. Mathew

Fodder Crops

Project Co-ordinator Dr C. Sreedharan

Members : Dr V. Gopinathan Nair, Mr G. Raghavan Pillai, Mr K. P. Mathew, Prof. T. E. Kuriakose, Dr M. C. Nair, Associate Professor (Horticulture), RRS, Thirumeni, Thodupuzha

Plant Protection

Project Co-ordinator : Dr N. Mohandas

Members : Mr K. P. Vasudevan Nair, Mr P. Madhavan Nair,
Dr C. C. Abraham, Dr T. Velayudhan, Dr M. C. Nair, Dr T. S. Venkitesan,
Dr Abi Cheeran, Dr P. M. Rajan, Mr P. T. Rajendran Nair,
Dr James Mathew, Dr S. L. Nair, Dr M. T. Thomas

Soils & Agronomy

Project Co-ordinator : Dr P. Padmaja

Members : Dr C. Sreedharan, Dr R. Vikraman Nair, Dr V. K. Sasidhar,
Mr P. J. Tomy, Dr K. S. Aiyer, Dr E. P. Rajaram, Dr A. I. Jose,
Mr P. K. Gangadharan Menon, Mr N. N. Ramakutty,
Dr P. Balakrishna Pillai

Farm Economics, Extension & Statistics

Project Coordinator : Dr V. Radhakrishnan

Members : Prof. of Agril. Extn., College of Agriculture, Vellayani,
Mr K. S. Karayalar, Mr E. R. Narayanan Nayar, Dr K. Mukundan,
Dr T. Prabhakaran, Mr P. Ramachandran Nair, Dr C. A. Jose,
Dr. N. Rajan Nair, Mr M. Mohandas

Soil Conservation & Farm Mechanisation

Project Co-ordinator : Prof. T. P. George

Members : Dr A. N. Remadevi, Dr P. Balakrishna Pillai,
Mr. John Thomas, Mr K. P. Madhavan Nair, Mr C. P. Muhammed,
Mr Jippu Jacob, Officer i/c AICRP on Agrl. Drainage, Kurumady

Cropping Pattern & Farming System

Project Co-ordinator : Dr V. K. Sasidhar

Member : Prof. P. N. Pisharody, Dr K. P. Rajaram, Mr N. Rajappan Nair,
Mr K. I. James, Mr K. Kannan, Dr N. Mohanakumaran,
Mr K. P. Madhavan Nair, Dr C. C. Abraham, Dr Abi Cheeran,
Dr V. Radhakrishnan, Dr C. R. Ananthasubramaniam,
Dr K. Karunakaran, Dr R. Vikraman Nair, Mr P. J. Tomy

VETERINARY & ANIMAL SCIENCES

Cattle & Buffaloes

Project Co-ordinator : Dr C. R. Ananthasubramaniam

Members : Dr M. Subramanyam, Dr G. Nirmalan, Dr E. Sivaraman
Dr T. G. Rajagopalan, Dr G. Mukundan, Dr C. P. Neelakantan,
Dr P. A. Oommer, Dr M. V. Sukumaran, Dr V. Jayaprakash,
Dr P. P. Balakrishnan

Goat

Project Co-ordinator : Dr G. Mukundan

Members : Dr K. M. Ramachandran, Dr V. Sudarsanan, Dr E. Mathai, Dr B. R. Krishnan Nair, Dr C. A. Rajagopalaraja, Dr N. Kunjikutty, Dr N. M. Aleyas, Dr C. S. James, Dr N. Gopakumar, Dr V. Sathianesan

Poultry including ducks

Project Co-ordinator : Dr A. Ramakrishnan

Members : Dr A. Rajan, Dr A. K. K. Unni, Dr C. K. Venugopalan, Dr R. Sabarinathan Nair, Dr Maggie D. Menachery, Dr M. G. Ramakrishna Pillai, Dr Sosamma Iype, Dr K. T. Punnoose, Dr K. P. Surendranathan, Dr C. George Varghese

Pig, Elephant, Dog & other species

Project Co-ordinator : Dr G. Nirmalan

Members : Dr C. R. Ananthasubramaniam, Dr Jacob V. Cheeran, Dr K. Rajamohan, Dr P. S. Pushkaran, Dr K. Chandrasekharan, Dr P. Ramachandran, Dr K. N. Muraleedharan Nair, Dr Kurien Thomas, Dr E. Nanu, Dr C. Pythal

Animal Reproduction & Artificial Insemination

Project Co-ordinator : Dr C. P. Neelakantan

Members : Dr G. Nirmalan, Dr K. Prabhakaran Nair, Dr V. Sudarsanan, Dr S. Sulochana, Dr K. Pavithran, Dr K. Ramadas, Dr M. Sthanumalayan Nair, Dr P. A. Devassia, Dr T. Sreekumar, Dr M. Mukundan

Animal Diseases

Project Co-ordinator : Dr A. Rajan

Members : Dr P. O. George, Dr E. P. Paily, Dr R. Padmanabha Iyer, Dr K. M. Alikutty, Dr K. Rajamohan, Dr S. Sulochana, Dr M. Soman, Dr C. T. Thomas, Dr M. Krishnan Nair, Dr M. K. Rajagopalan

Unclassified

Project Co-ordinator : Dr T. Prabhakaran

Members : Dr R. Padmanabha Iyer, Dr K. I. Mariyamma, Dr K. C. George, Dr P. T. Georgekutty, Dr G. Venugopal, Dr Zacharias Cheriyan, Dr K. Madhavan Pillai, Dr P. Prabhakaran, Dr E. Madhavan, Dr Francis Xavier

Appendix VII

LIST OF ICAR CO ORDINATED AND ADHOC RESEARCH PROJECTS

FACULTY OF AGRICULTURE

ICAR Adhoc Schemes

Title of the scheme	*Location*
Studies on the strains of rhizobia of pulses, the effect of nutrient on them and standardisation of mass culturing technique	College of Agriculture, Vellayani
Research on *Cymbopogon Flexuosus* and other cymbopogon species	Aromatic and Medicinal plants Res. Station, Odakkali.
Adaptive trials of improved varieties of annual oilseed crops in Kerala	Agricultural Research Station, Mannuthy
Development of improved varieties of sesamum and groundnut suited to the rice fallows in the Onattukara region	Rice Research Station, Kayamkulam
Survey, appraisal and control of major diseases of sugarcane	Sugarcane Research Station, Thiruvalla
Cyst nematode, Heterodera oryzicola infesting rice in Kerala	College of Agriculture, Vellayani
Marketing of coconut and cocoa in Kerala	College of Horticulture, Vellanikkara
Tapioca consumption and Goitre incidence in Kerala	College of Agriculture, Vellayani
Post harvest technology in perishable foods	College of Agriculture, Vellayani
Mechanical control and utilisation of floating type aquatic weeds	College of Horticulture, Vellanikkara
Design and development of wind turbines and its feasibility studies in Kerala	Institute of Agricultural Technology, Tavanur

ICAR Co-ordinated Research Projects

AICRP on Agro-forestry	Livestock Research Station, Thiruvazhamkunnu
AICRP on Farm Implements & Machinery	College of Horticulture, Vellanikkara
AICRP on Nematode pests	College of Agriculture, Vellayani
AICRP on Agrl Drainage	Karumady
AICS & CIP—Research on Pepper	Pepper Research Station, Panniyur
Research on Cashew	Cashew Research Station, Madakkathara
Research on Ginger	College of Horticulture, Vellanikkara
Research on Cardamom	CRS, Pampadumpara
AIC Floriculture Improvement Project	College of Horticulture, Vellanikkara
AICRP on Fruits – Research on Banana	Banana Research Station, Kannara
– Research on Citrus	RARS, Ambalavayal
NSC Breeder Seed Production Unit	RARS, Pattambi
AICRIP Pattambi	RARS, Pattambi
Mannuthy	ARS, Mannuthy
Moncompu	
(BPH & GLH trials)	RRS, Moncompu
Moncompu (Soil Research)	
Pest Research	RRS, Moncompu
AIC Pulses Improvement Project	RARS, Pattambi
AIC Vegetable Improvement Project	College of Horticulture, Vellanikkara
AIC&AP (Coconut & Arecanut Improvement Project)	RARS, Pilicode
AICRP on Forage Crops	College of Agriculture, Vellayani
AICRP on Biological Control of Crop Pests	College of Horticulture Vellanikkara
AICRP on Sorghum	RRS, Hirehalla
AICRP on Water Management	ARS, Chalakudy
AICRP on Characterisation of saline and alkali soils	RARS, Pattambi
AICARP & ECF Units	CPCRI, Kasaragod, Ouilon and Pattambi

Fate and Efficiency of Urea based fertilizer in India	CSRC, Karamana
AICRP on Tuber Crops	College of Horticulture, Vellanikkara.
MSCRP	Madakkathara
AICRP on Weed Control	College of Horticulture, Vellanikkara
Operational Research Project for Resource Development on Watershed basis	Ozhalappathy, Palghat dist
ORP on Rice Pests, Kuttanad	Rice Research Station, Moncompu

FACULTY OF VETERINARY & ANIMAL SCIENCES

ICAR Ad hoc Schemes

Karyological studies in cattle of Kerala State with special reference to infertility and sterility	College of Veterinary & Animal Sciences, Mannuthy
Breeding rabbit for meat production	do
Nutrient requirement of caged layers	do
Toxic effects of Industrial effluents on animals	do
Studies on Blood groups and biochemical polymorphism in cattle	do
Mycotoxicosis in domestic animals and poultry	do
Assessment of the economic losses resulting from commonly prevalent diseases in specified areas	do
Efficiency of white pekin ducks, desi ducks and their crosses for meat production	do
Progeny testing of cross bred bulls in rural areas	do

ICAR Co ordinated Projects

AICRP on Poultry	Mannuthy
AICRP on Goat	do
AICRP on Agrl By Products	do

Appendix VIII

LIST OF SCHEMES SENT FOR SANCTION

Title of the scheme	Funding Agency	Amount proposed (in lakhs)
Germplasm enhancement and evaluation of Indian Pepper Egg plant and tomato lines for sources of disease resistance	ICAR	5.80
Preservation and nutritive quality of miscellaneous fodders with special reference to subabul (*Leucena leucephala*)	ICAR	4.95
Preparation of alcoholic and non-alcoholic beverages from Cashew apple	ICAR	2.72
Survey of edible mushroom flora of Kerala and exploring the possibilities of standardising techniques	ICAR	5.04
Biogas Research and development—Ad-hoc project proposal	ICAR	4.83
Estimation of damage due to pests, diseases and drought in black pepper in Calicut district of Kerala	ICAR	6.62
Ad-hoc scheme Quail farming	ICAR	4.64
Incidence and nature of hypothyroidism in domestic animals	Dept of Science & Technology GOI	9.87
Feed protein evaluation and expression of protein requirements of cattle based rumen degradable nitrogen	ICAR	20.00
Microbial control of major pests of coconut palm	ICAR	7.18
Economics of mixed farming and Resources use efficiency A study of typical farming situations in Kerala	ICAR	3.04

Development of Primary Co-operative Societies for speedy extension of technologies	ICAR	6.95
Impact of land reforms on Agrarian structure and agricultural production in Kerala	ICAR	2.63
Seed borne diseases of Rice in Kerala	ICAR	3.52
Survey, collection and evaluation of off-season bearing varieties of mango	ICAR	5.30
Nitrogen fixing bacteria associated with plantation and orchard crops of Kerala	ICAR	11.00
Developing monosomics and triosomics in cucumber (*C. sativus L*) and locating genes on chromosomes	ICAR	4.90
Investigation into the role of free flying birds in the transmission of parasitic nematodes in domestic animals	Science & Technology GOK	0.19
Soybean processing and utilization Research	ICAR	29.50
Estt. of a Regional research cum Diagnostic pathology centre	ICAR	12.85
Investigations regarding aetiology, pathogenesis and line of treatment of Degnla diseases in livestock	ICAR	23.54
Genetic improvement of Groundnut	ICAR	3.67
Standardisation of tissue apical meristem culture techniques in horticultural crops of Kerala	ICAR	52.17
Investigations on the post harvest deterioration of common fruits in Kerala	ICAR	14.23
Spatial micro-level planning for integrated rural development	ICSSR	0.43
Utilization of mycoparasites in the control of diseases caused by *Rhizoctonia solani*	Science & Technology, GOI	7.50
Research on Design, Fabrication and Testing of floating Rafts for raising crops	ICAR	16.45
Standardisation of agro techniques for the cultivation of crops on rafts	ICAR	7.34

Endemic ethmoid carcinoma in livestock	DARE	9.22
Potentials and prospects of *Leucaene leucocephala* under different cropping systems in homesteads of Kerala	Council for advancement of Rural Technology, New Delhi	9 99
Biomass of fuel value and as a source of value added products from the coconut palm quantification as relevant to house wives of small and marginal farmers	Dept. of Science & Tech. GOI	1 26
Shade studies on coconut based intercropping situations	ICAR	5 55
Possibilities of using cassava stem as fuel in rural households in Kerala	State Committee on Science & Tech., GOK Trivandrum	0 41
Induced mutation in Tuber crops	International Atomic Energy Agency, Vienna	0 40
Induced mutation in Banana	Dept of Atomic Energy BRNS. Bombay	7 50
Scheme for post harvest technology as a part of the World Bank Scheme	PPM Cell, Govt of Kerala, Trivandrum	75 00

Appendix IX

STATUTE AND AMENDMENT ISSUED DURING 1984 85

1 Amendment to statute issued vide notification GA/20658 A3 83 dated 9 5 84 to SRO No 447 72 as assented by the Chancellor with effect from 5 1 84 creating a new department of Home Science with the subject Food Science & Nutrition as per reference to rural problems

2 as per notification GA 6023A A3 79 dt 16 12-81 to SRO 264 74 (Professors, Assoc. Professors, Asst. Professors) relating to the norm promotion of the teaching staff belonging to the above categories

3 as per notification GA 7063 A3 83 dt 8-10-84 amending the statute SRO No 1065 79 dt 22-8-79 relating to change in designation of the Agricultural Demonstrators as Farm Assistant (Agril.)

4 As per notification GA 7062 A3 83 dt 8-10-84 to SRO 293 72 dt 15 6-72 relating to the posting of employees of other universities by transfer on reciprocal basis

5 As per notification GA A3 9009 83 dt 21-3-85 amending the statute SRO No. 476 72 dt 14-9-72 relating to the appointment, salary and allowances and duties of the Registrar